

DANAS Pro

User Manual

Version 2.0 – January 2020

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INSTALLING DANAS PRO

Danas Pro does not require a real installation; it can just be launched. Danas has been developed in a Java environment: therefore, it is necessary to have Java installed on your machine. To take full advantage of Danas Pro features, it is recommended to use a 64-bit version of Java. With a 32-bit Java version, the RAM memory available to Danas is upper limited to 1.2GB whereas with 64-bit Java Danas can access the entire RAM memory available on your machine.

Download DanasPro_folder.zip from i2m website and unzip the file. If running Danas on Windows or Linux, it is possible to move the folder anywhere you like, but write permission in the destination folder is required (folder /Programs is not recommended). If running Danas on iOS it is necessary to copy DanasPro folder to Applications folder.

Within DanasPro folder there is a DanasPro.jar file that can be directly executed with Java (Don't move the files from the folder). The same result is obtained launching DanasPro.app on iOS or DanasPro.exe on Windows.

Within DanasPro folder there is also the defaultCircuits.cir file that contains data on the position of the finish line in the various circuits. It is possible to update this data by simply replacing the current file with its most recent version that can be downloaded from i2m website.

Also within the DanasPro folder, it is possible to find (while using the software) the DanasPro.log file if the log file writing option is on in the options menu. In case of malfunction, it is recommended to copy and save the log file, so that it can be sent by email in case of request for assistance in order to facilitate the understanding of the problem.

To verify the Java version that is currently installed on your machine, it is sufficient to open a terminal and type `java -version`; this allows you to know both the installed version and if it is a 32- or 64-bit Java version (in the latter case the last line of the output clearly reports the 64-bit version).

MAIN WINDOW

At first opening of Danas Pro, the window shown in figure 1 will appear. On the top, you can find the icon bar, while on the right there are the data, statistics and map subwindows; if you don't see these three subwindows, double click on the *show graph curves* subwindow.

The *view* menu allows you to customize the window visualization. It is possible to choose if you want to see the map, the status bar (which reports info on the memory in use), the icon bar and if you want to show the time table (that will automatically appear when a file is open). To maximize the exploitation of the monitor, some functions as, for example, the map options or the session viewer and lap viewer access are hidden by default. You can access these functions by means of the functions and map menus or you can make the corresponding tabs directly visible in the main window by selecting them in the *show* menu. From the same menu, you can choose to visualize the map, data and statistics in the vertical bar or you can undock them and have them in separate windows. Finally, the *show selected info automatically* option of the show menu allows you to select an area by moving the cursor while holding the right mouse button and it makes the window with info on the selected interval to automatically appear.

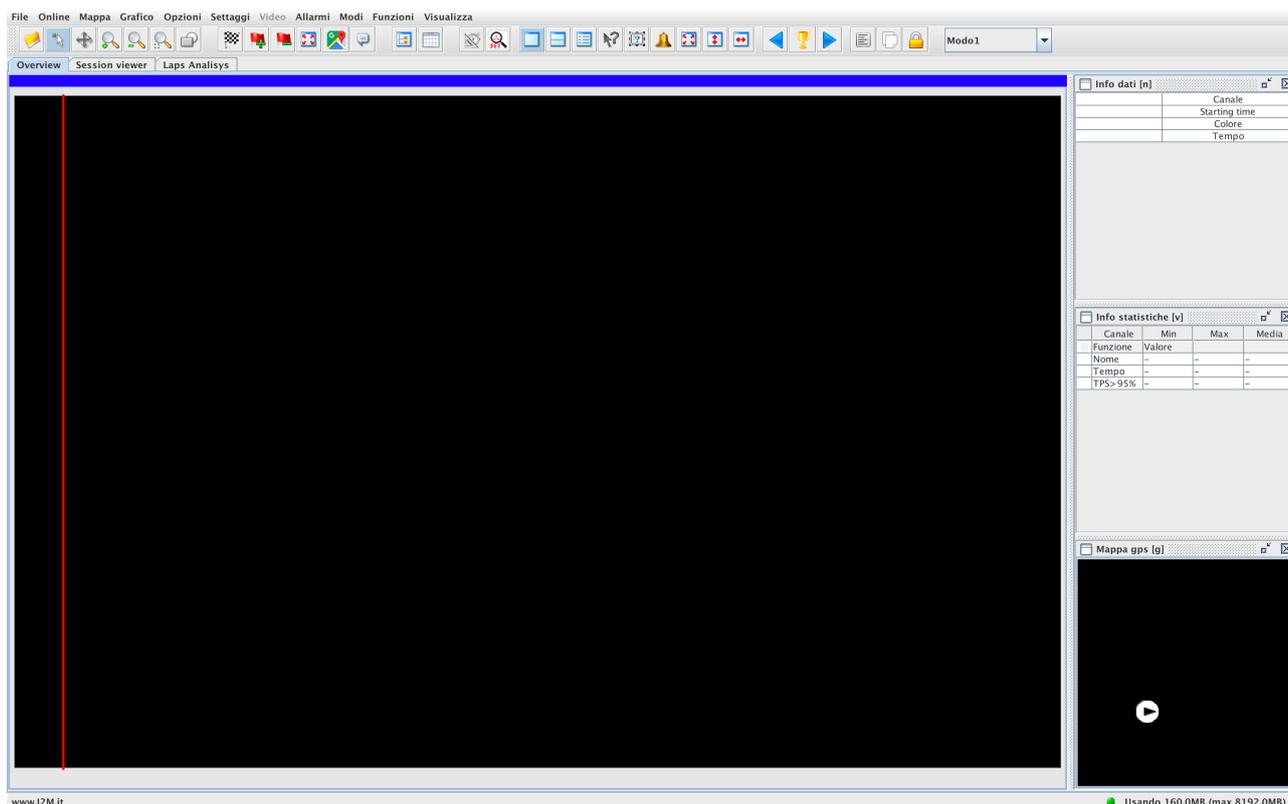


Fig. 1- Danas Main Window

Data, statistics and map subwindows can be undocked or closed by using the buttons at the top right of each of these subwindows. It is possible to move both the vertical and the horizontal delimiters to adjust the space devoted to each subwindow.

At the top of the graph there is a bar indicating the portion of the session / lap displayed at that moment. It is possible to move, enlarge or tighten the blue bar directly to change the display. In session mode the bar is split indicating the various laps highlighting the time for each lap and highlighting the best lap in violet. A double click on the part of the bar relative to a lap allows you to automatically zoom in on that lap.

DEFAULT SESSION AND DEFAULT LAP

Session and default lap are two key parameters in Danas. The software allows you to synchronize the map, the graph and any video (if present) that have been acquired at the same time.

Let's imagine that we have 2 selected sessions and they are shown on both the graph and the map: if a video is present, to which one of the two sessions will it be referred to? Also, if we put a cursor on the map that is synchronous to the cursor on the graph, which path should the cursor follow? The path of which one of the two sessions? These potentially ambiguous situations are only an example of the many possible scenarios that can raise a reasonable doubt about the matter. Danas removes any potential ambiguity resorting to the definition of a default session and a default lap.

Depending on whether laps or sessions are shown, Danas will always have a default waveform as a reference. What will it be the represented video? That is simple: it will be the video referred to the default session (in case we are in lap mode, it will be the video referred to the session to which the default lap belongs).

Which will it be the path that the map cursor will follow? Again, it will be the path corresponding to the default session (or default lap). Whenever new data are loaded, the system automatically selects one default session and one default lap; the default session and lap can be changed by the end user

directly by right-clicking the desired session or lap in the time table. If a single session or lap are loaded, Danas automatically makes them the default session or lap.

OPENING A SESSION AND FILE MENU

File menu allows the management of files opened in DanasPro and it allows to export them. To open a new session, click *Open* in the File menu and select the file of interest.

Open database

Open Database option in the File menu allows a more extensive management of the user data. This function opens the window shown in figure 2.

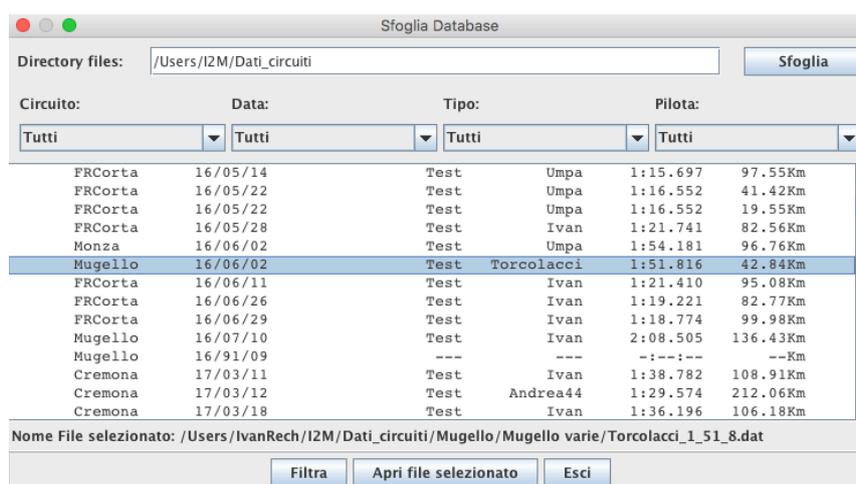


Fig. 2- Database window

Enter the path of your data file folder in the *Directory files* field: Danas will automatically scan the directory looking for all the files that contain data and a summary will be shown as a result. For this reason, it is not necessary to sort files or put them into separate folders: you can simply put them all in the folder selected as archive. Some data, as the location, the driver name and the date are automatically saved by our loggers as Dasy or Chrome. The best lap, the km travelled and the type of event (if any) are computed by Danas at the first save. Therefore, it is possible to filter the archive files on the basis of the circuit, the date, the driver or even the event type, selecting and opening only the file of interest.

Remove sessions, Remove Selected sessions

Remove sessions and *Remove Selected sessions* functions of the File menu allow the user to remove all sessions, or a selected subgroup of sessions, from Danas memory.

Save sessions, Save Selected sessions, Save Default Lap

Similarly, *Save sessions* and *Save selected sessions* functions allow the user to save data of all sessions or of a selected subgroup of sessions. *Save Default Lap* function, instead, saves a session containing only the default lap; this can be useful to keep a particular lap as a reference to make a comparison with other sessions in the future without re-opening the whole session.

Export

Export option allows the user to export, by means of the specific dialog window, the selected sessions in kml format, that can be used to visualize the data with Google Earth, or in csv format or in a format that is compatible with 2D softwares.

Language

The *Language* option allows the user to select the software language between Italian and English. The selected language option will be active upon the next start of Danas.

Danas name on windows

In case more than a Danas window is open at the same time, this function allows the user to rename each main window of Danas to it easily distinguishable from the others.

Updates

Danas can automatically search for updates on www.i2m.it website and install them, if present. The search can be done automatically at each start of Danas, or upon user request. In both cases, an Internet access is mandatory.

SESSIONS/LAPS TABLE

At the opening of the first file, a table with the summary of sessions and laps is shown in a window. The table provides the summary of the sessions and laps that are currently in Danas memory; the sessions and laps to be visualized can be selected and some preferences can be modified here. The table features three tabs: Sessions, Laps and Notes.

'Sessions' Tab

The 'Sessions' tab shows the data of all sessions.

In each line we can find: the flag to select/unselect each session, the color of each session, a progressive number for each session, the name of each session's data, the date, the start hour, the elapsed time, the travelled distance, the number of laps of each session (if a finish line is present), the best time of the session, the video and the current settings of each session.



Tabella tempi/sessioni [!]													
Sessions Giri Note													
Sel.	Colore	Sessione	Filename	Data	Start	Trascorsi	Distanza(Km)	Giri	Best	Pilota	Tipo	Video	Settings HW
<input type="checkbox"/>		1	Ivan_Cremo...	2018/10/06	09:42:33	00:16:39	32.37	8	1:36.103	Ivan	Test		
<input type="checkbox"/>		2	Ivan_Cremo...	2018/10/06	12:01:50	00:08:15	16.0	3	1:38.080	Ivan	Test		
<input checked="" type="checkbox"/>		3	Ivan_Cremo...	2018/10/06	12:10:11	00:06:59	13.05	3	1:36.638	Ivan	Test		

Desel. all TEMPO TOTALE: 00:06:59 DISTANZA TOTALE: 13Km

Fig. 3- Sessions/Laps table: 'Sessions' tab

By clicking on the color, video or settings field of each session, we can open the corresponding window that allow us to select or modify each of these three parameters for each session.

The 'Interno' mode in the settings window means that the internal settings of the file have been used for that particular session.

In the video field, two different icons can be found: a blue icon if a video is associated to the session or a crossed-out red one if there is no video for the session itself.

By right-clicking on one of the table lines, a window will appear: it allows the user to use the selected session as default. Once the default session is selected, the corresponding line in the table will be grey.

At the bottom of the Sessions/Laps table window, the info on total time and total distance are reported; besides, there is a button to rapidly select/deselect all the sessions in the table.

'Laps' Tab

The 'Laps' tab provides the summary of all the data of the laps corresponding to the selected sessions. The first column is the select flag of the line: it is used to select/deselect each line, corresponding to one of the laps. The second column shows the color that is used in Danas to represent the corresponding lap. For each lap, the user can customize the color by clicking on the color field and choosing a new color from the 'Pick a color' subwindow.

The third column provides a number to identify each single lap within each session (for example, 4-1 means first lap of the fourth session). The fourth column reports the time that has been registered in each lap: the best time of the session is highlighted in bold font.

The last column reports the length of the lap (depending on the trajectory of the driver, the travelled distance can significantly change). Additional intermediate columns may appear if a split is added on the map: they report the time to reach one of the stopwatch points. Also in this case, the best time for each stopwatch point is highlighted in bold character.

It is worth recalling that if one of the splits is wrongly added (in case the stopwatch point is not crossed at each lap, for example, or in case a new split is placed before an old one) the corresponding field in the table will be highlighted in **red**.

For each line that represents time (either a total or a split time), it is possible to show the time difference with the best lap by simply moving the cursor on the time field of interest.

In bold, the best SPLIT of all laps is highlighted, while in italic bold the best SPLIT of the selected laps is highlighted.

The lines can be sorted in ascendant, descendent or acquisition order with respect to any of the columns by repeatedly clicking on the title of the column itself. The chosen order is identified by an arrow at the top of the column.

At the bottom of the Laps tab, a button allows a rapid selection/deselection of all the lines; moreover, in this part of the tab the **Best**, the **Average** and the **Ideal** times are reported; the ideal lap is built using the best time for each stopwatch point. The best, average and ideal times are computed only on the selected laps.

The two blue arrows at the bottom of the tab allow to singularly select the laps of the session; by selecting the 'Compare with default' button, it is possible to select again each lap but the default lap will be always selected as well and it will be used as a reference.

By right-clicking on one of the table lines, a subwindow will appear: it allows the user to use the selected line as default lap. Once the line is selected as default lap, it will be highlighted in grey.

'Notes' Tab

Finally, in the 'Notes' tab it is possible to add notes for each session. The notes will be saved in the session file and they will be made available at the reopening of the file.

ONLINE MENU

By means of this menu, it is possible to handle the remotely-connected devices as MiniLAP, Dasy or Chrome.

With a MiniLAP or a Dasy, first of all it is necessary to select the COM serial port to which the device is connected. Indeed, even in case of a Dasy, that is connected to a USB port, the FTDI chip within the Dasy simulates the presence of a serial port to which the PC will give an identifier.

By selecting the Com Choice function, it will be possible to select the desired COM port from the menu and it can be confirmed by clicking the OK button. If the COM port to which the device is connected is not known, an automatic search can be started in Danas (Search button); Danas will identify the first port connected to an I2M device. If the search provides a valid output, it is sufficient to press the OK button to confirm the choice. With a MiniLAP device, recall that the "download" mode has to be activated in the MiniLAP itself to make it visible in Danas.

Data Download from MiniLAP/Dasy: this function allows the data download from a Dasy or a MiniLAP. Upon the selection of this function, the window reported in figure 4 will appear. Select the device type and press the download button. When a connection with the selected device is established, it is possible to start the data download, by clicking the download button, or the device SD memory can be erased clicking on the SD Format button. The ‘Save on File’ option can be selected and the name of the file can be chosen clicking on the Browse button (the file has to be selected *before* starting the download).

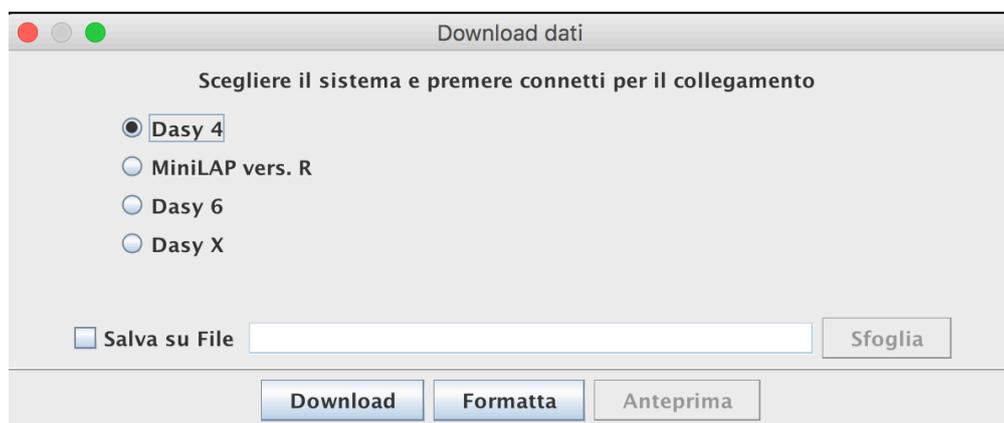


Fig. 4- Data Download

In case of a Dasy, once the connection with the device is established, it is possible to run the “Preview” function which allows the download of the list of the sessions stored in the system. In figure 5 a typical Preview window is shown: if the GPS is present, for each sessions we can have data about: location (if present among the in-memory circuits), date and hour. It is then possible to filter the session to visualize only those of interest and open all the visualized sessions or only those that have been selected.

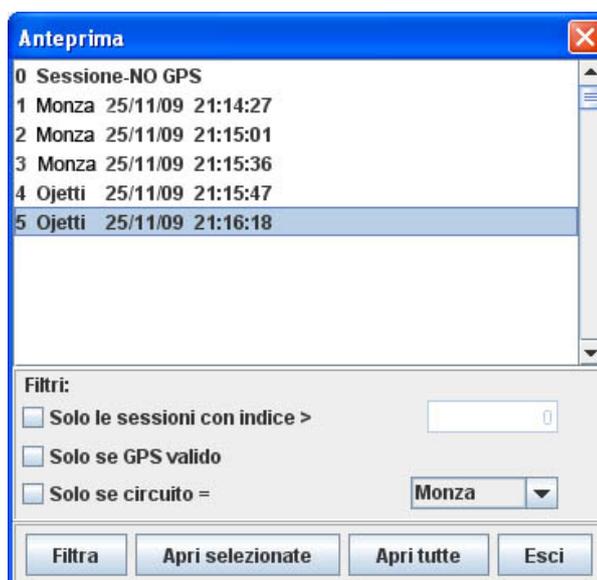


Fig. 5 – Data Download - Preview

- **Configure MiniLAP circuits:** this function of the online menu opens a window for library management as shown in figure 6.

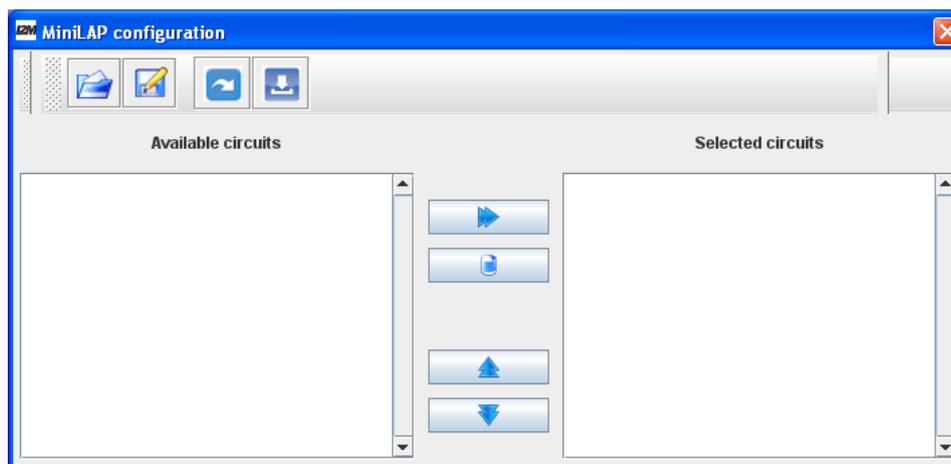


Fig. 6- Configura circuiti MiniLAP

The right box contains the circuits that will be download from or uploaded to the MiniLAP. On the other hand, the left box contains all the available circuits (Danas default circuits or circuits that had been previously saved on file): these circuits can be used to update the circuits on the MiniLAP. In fact, it is possible to upload any of the available circuits on the MiniLAP with a simple drag and drop from the available circuits to the selected circuits box (the transfer is disabled if more than 20 selected circuits are present, since 20 is the maximum number of circuits that can be stored on a MiniLAP: if this limit is reached, it is necessary to delete one or more circuits on the MiniLAP before a new circuit can be uploaded).

ATTENTION: when we add a circuit to the MiniLAP having a finish line in a different position with respect to the circuit previously saved in the same position, the BestTime is canceled since it would have no sense anymore.

ATTENTION: the stored laps will not be deleted.

- **Configure DasyX circuits:** this menu is the same as the MiniLAP configuration menu.
- **Hardware DasyX settings:** this function allows the configuration of the hardware parameters of the DasyX system. Referring to figure 7, in the first box on the left it is possible to select the autostart channel, that is the condition to start the sampling: it can be the speed of the upper wheel that overcomes a given speed, or it can be the GPS speed or RPMs. It is possible to set that all these conditions must be true at the same time by checking the “All at the same time” flag; we can also set the minimum time for which these conditions must be true before starting the sampling. The minimum values section (second-left box in figure 7) allows us to configure the thresholds of the selected autostart channels. The sampling section (third-left box) allows us to choose the sampling frequency, while the pulses section (fourth-left box) allows us to configure the digital inputs of the system in case it is not connected to a can bus. The number of pulses corresponds to the number of pulses read by the system for each revolution of the drive shaft or of the front or back wheel. Finally, the Kind of bike menu (last box) allows us to select one of the bikes featuring a can bus compatible with the DasyX; in this way, the channels of the can bus are automatically configured without the need to set, for example, the number of pulses as for the “analog” bikes.



Fig. 7–Dasy Settings, digital channels

- **DasyX software settings:** this function allows the configuration of the DasyX software settings, that are applied to the data that have already been acquired.

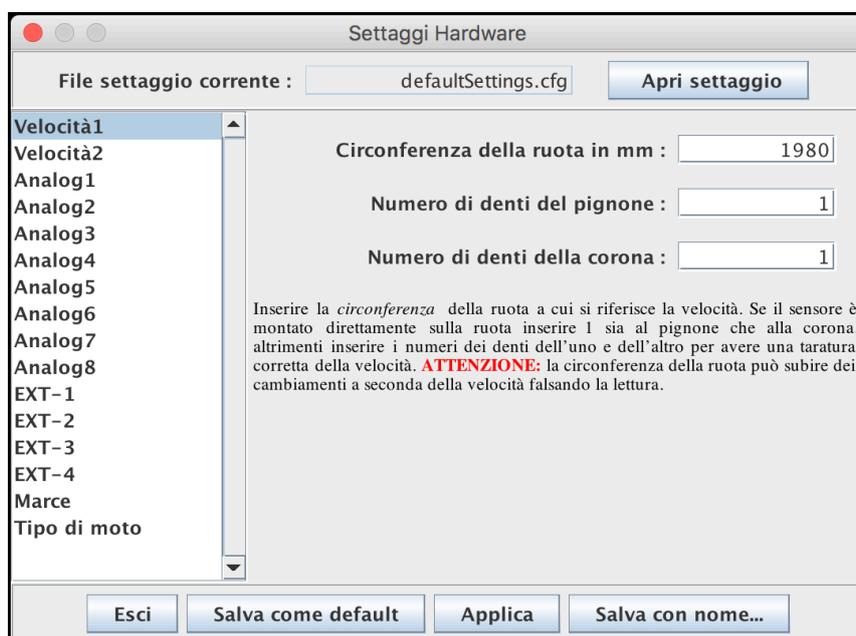


Fig. 8 –Dasy software settings

On the top of the window, you can see the currently-used settings file. The “open setting” button allows us to open different settings files.

In the central part of the window, there is a box on the left with the list of the available channels, while on the right we have, for each channel, the parameters that can be modified.

- **For the speed channels:** here it is necessary to set parameters like the wheel circumference (this measure has to be extremely precise since it is used as multiplication factor to compute the final speed), the number of teeth of the sprocket-wheel (in case the speed were computed using a sensor on the sprocket, the proper configuration of the final gear ratio is crucial to avoid any error), the number of teeth of the crown (as for the sprocket-teeth number, this parameter must be accurately configured; if the sensor were placed directly on the wheel both the number of sprocket teeth and that of crown teeth must be set to 1).
- **For the analog channels:** here parameters like the reference name, and the minimum and maximum graph values can be set. The analog inputs are converted from voltage values in the range 0-5V to digital values in the range 0-1023; these two parameters allow us to configure what is the real value to be considered when the sampled voltage is equal to zero and which is the real value corresponding to 5V. For example, with a 150-mm potentiometer, the minimum value is

zero (when the wiper is at one end, the output voltage is zero) while 150 corresponds to the maximum value.

With more complex analog channels, the conversion might not be straightforward. For example, with a TPS signal, the output of the control unit does not entirely cover the 0-5V range; therefore, it is necessary to properly set the minimum and maximum values to have a proper visualization of the desired data on the graph.

- **For the gear channel:** it is necessary to set the gear ratio that identify the gears (as in any common gear indicator); if the Engine Rounds/(Wheel rounds) ratio that defines the bike gear ratio is known, it is sufficient to insert the values in the given fields (ATTENTION: it is necessary to set the right number of sprocket teeth to avoid any measurement error). Otherwise, Danas provides a tool to calculate the proper numbers: by clicking on “Calculate”, Danas2.x will compute the ratio on the basis of the first selected session. A session where all the gears have been used must be used in this phase and where each gear has been held for at least 10 seconds (it is recommended to create a session on purpose for this calibration).
- **Kind of bike:** by choosing the kind of bike, the name of the multi channels in the graph are automatically selected. This function is available only with files coming from the Chrome system.
- **DasyX Online:** This function allows us to establish an online connection with the Dasy system, to acquire the readout values in real time and to configure the hardware parameters of the speed pulses and RPM. First of all, press the Connect button to connect the device. The window features three tabs, as shown in figure 9: the first tab corresponds to the digital inputs, the second one to the analog inputs and the third one provides a summary of all inputs.

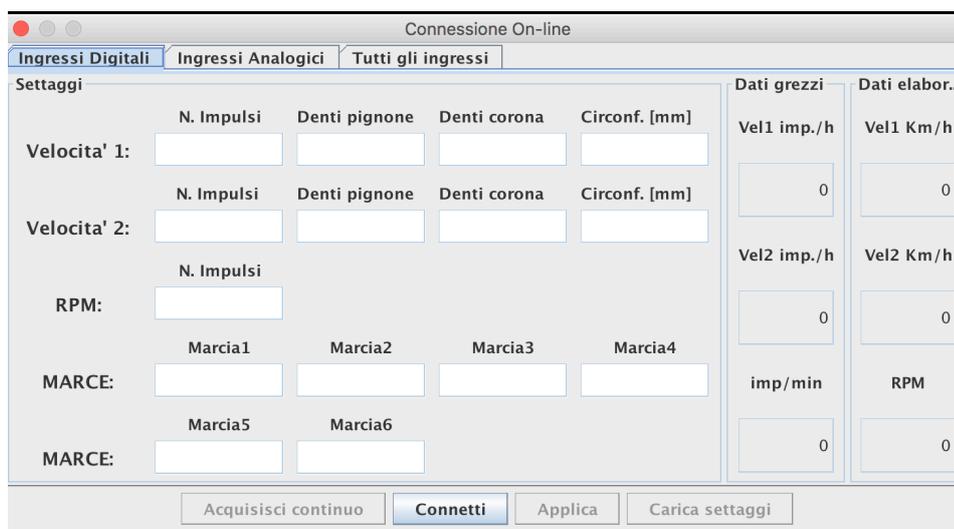


Fig. 9– Configuration of Dasy digital channels

Digital and Analog inputs sections feature three different fields:

- **Settings:** here, all the configuration parameters that are read when the Dasy is connected are shown (hardware parameters)
- **Raw Data:** in this section we will have the raw data that are acquired by the Dasy
- **Processed Data:** in this section we will have the acquired data that have been elaborated on the basis of the setting parameters of the previous sections.

A few functions are available:

- *Continuous acquiring*: it implements a continuous data sampling from the Dasy and, in real time, it shows the acquired data into two separate boxes of the window (raw data and processed data); data are acquired approximately once per second.
- *Apply/Load Settings*: These functions allow the user to load or save the current settings.
- *Configure Sensors*: with this function it is possible to open a window that can be used to configure online the settings of the most common analog sensors (it is present only in the Analog Inputs tab).

It is possible to manually change any parameter in the window by simply selecting it and writing the new value; the effect of the new settings on the processed data can be immediately visualized by using the Apply button.

- **Upgrade firmware DasyX**: This function allows the user to load a firmware upgrade on the DasyX.
- **Configure Chrome circuit**: This function is totally equivalent to the “configure MiniLAP circuit” function. By means of this function, it is possible to generate a file with 20 circuits (it is NOT possible to create a file with a lower number of circuits); the file can be loaded by the Chrome with the “import circuit” function.
- **Chrome Settings**: Chrome settings window permits the configuration of the Chrome replicating all the present configurations and loading them on the Chrome by means of a USB drive (with settings import/export) or using a WiFi transfer in case of Chrome Plus or Pro (if a connection between Danas and the Chrome exists).
- **WiFi Chrome Plus/Pro**: Chrome Plus and Pro, thanks to the WiFi antenna, can be connected to a network. If the pc on which Danas is installed and running is connected to the same network as the Chrome Plus/Pro, it is possible to establish a direct connection between Danas and the Chrome. To this aim, it is necessary that the network supports broadcast messages. A dedicated button allows you to test the network. The list of the visible Chromes is reported in the table (and can be updated with the dedicated button). After selecting one of the visible Chrome systems, it is possible to proceed with the connection and the download of the files or, using the *chrome settings* button, it is possible to invoke the Chrome settings function.

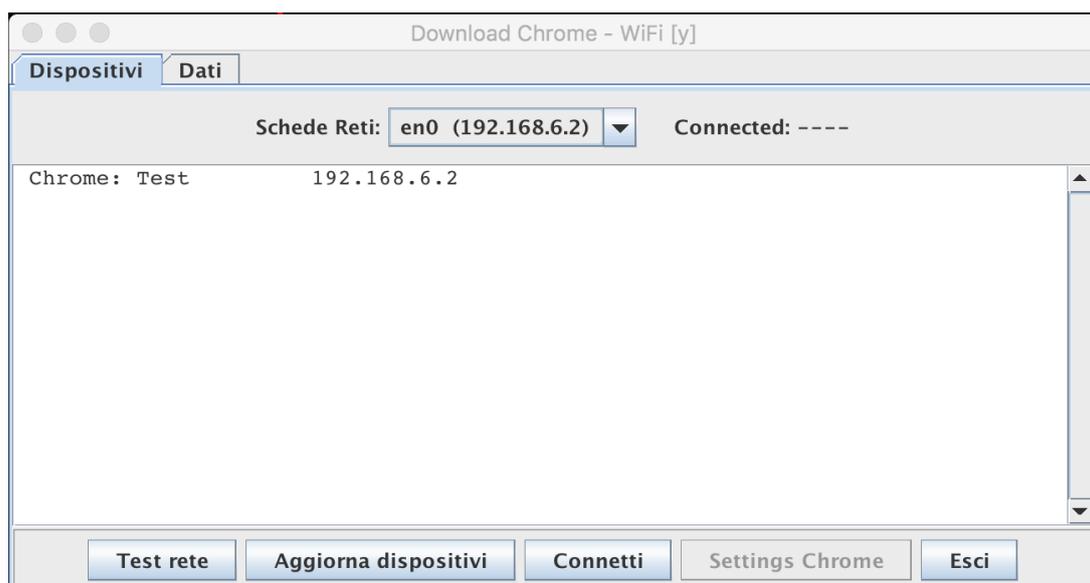


Fig. 10– Chrome Data Download – WiFi connection

- **Hide download window:** this function can be used to rapidly hide or show again the WiFi data download window.
- **TPMS:** this function allows the user to establish a connection with our TPMS radio receivers. First of all, the window that appears when this function is invoked allows you to choose the COM port where the receiver is connected to (the receiver features a FTDI chip that is recognized as a COM port by the PC). At the bottom of the window it is possible to add information on tiers that have to be monitored. For each tier, it must be specified the ID of the sensor, the name that you want to use for that sensor and whether it is mounted on a back or front tier. The front/back specification is needed to use the alarms that can be configured in the bottom right part of the window. Both for pressure and for temperature, a minimum and a maximum value can be set as boundaries of our measurement. When the value of pressure/temperature is below the minimum set by the user, the corresponding field is highlighted in light blue, when it exceeds the maximum one the field is highlighted in red. In the main window, the internal pressure, the rim temperature and the status of the battery (in percentage) is reported for each tier. The start / stop log button allows you to save the values acquired at any time in a csv file.

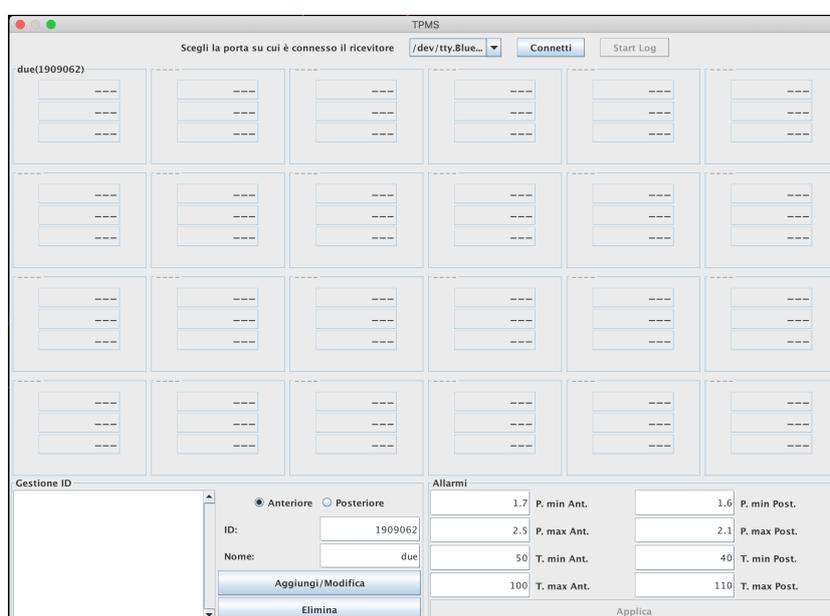


Fig. 11- read-out window of TPMS sensors

- **Hide TPMS Window:** it allows you to rapidly hide/show the TPMS window.

THE MAP AND MAP MENU

The Map allows the visualization of the collected GPS circuits, both in terms of sessions and single laps. If the *show map tab* has been enabled in the *show* menu, two tabs will be shown in the map: one tab corresponds to the real map, while the second reports the options of the map (as an alternative, it is possible to access the options tab using the map menu or the button with the gear icon in the icon bar). Among the options to set we have: the background color, the width of the lines, the height of the font of the graphic part.

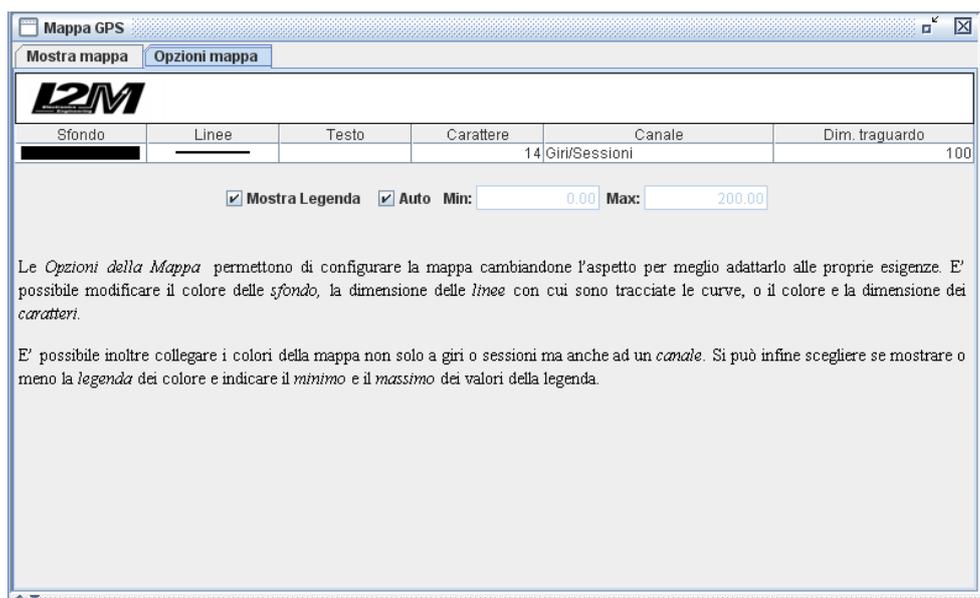


Fig. 12 – Map Options

Among the options, there is also the Dim.FinishLine field, that is the dimension of the finish line: the finish line is crossed if the path crosses the circle centered at the finish line coordinates and having a diameter equal to the number set in the Dim.FinishLine field. *By changing the dimensions of the finish line, both the dimensions of the finish line and that of the next splits will be changed accordingly.*

Thanks to the “channel” mode, it is possible to associate a degree of color to one of the curves on the basis of a particular acquired data. By default, the curves feature the same color of the session or of the lap to which they belong. By changing the channel entry, using the dedicated drop-down menu, it is possible to associate a color to each point of the circuit, where the color corresponds to one of the acquired channels as, for example, the GPS speed in that point, its acceleration (derivative of the speed), the RPM value or the value of any of the analog inputs (for example, the gas opening). This function is active only in lap mode and when at most 5 laps are visualized. Once the color of the channel to be visualized is chosen, on the map the circuits with the color legend on the side will be shown. The minimum and the maximum values of the color degree can be modified by the user to allow an exploitation of the chromatic range at the user’s leisure; as an alternative, you can choose the “Auto” mode and the software will automatically select the colors.

Finally, it is possible to hide the legend by simply checking the corresponding box.

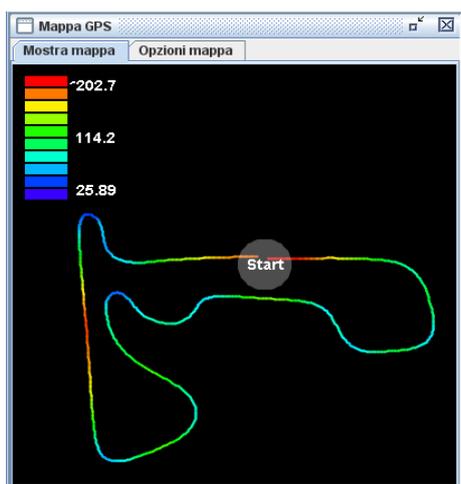


Fig. 13 – Channel Mode: GPS speed with legend

From the *map menu* it is possible to manage the functions relating to the map:

- **Zoom In:** this function activates the possibility to zoom in the map; by clicking somewhere in the map, the area around the selected coordinates will be zoomed in.
- **Zoom Out:** this function activates the possibility to zoom out the map; by clicking somewhere on the map, the image will be reduced keeping the selected coordinates as center of the reduced map.
- **Window Zoom:** it activates the selective zoom: if you select a rectangle on the map, its area will be magnified as much as needed to occupy all the available space in the map window.
- **Move:** this function allows you to move the map. You only need to click and drag the map. In this mode, you can zoom in or out the map by simply scrolling the mouse wheel.
- **Fit:** if you select this function, all the visible sessions will be fitted in their windows.
- **Add cursor:** with this function you can add a cursor on the map. The cursor is represented by a white circle with a black arrow inside; the arrow shows the direction of the circuit in that point. It is possible to change the cursor position by either scrolling the mouse wheel or left-clicking the cursor and slowly moving the pointer. By right-clicking and dragging it is possible to move the map within the window.
- **Google Maps:** enabling the Google Maps option it is possible to see Google Earth pictures under the driver's paths. An internet connection and a valid API KEY are required.
- **Change API KEY:** to enable Google Maps features, it necessary to insert a valid API KEY. The key is required by Google since July 2018 to gain access to “maps” services outside native Google apps. At the following link you can find details on how to get a key for static maps for Danas: <https://developers.google.com/maps/documentation/maps-static/get-api-key>
- **Ruler:** it allows you to compute the distance between two points on the map. After choosing this function in the map menu, left-click on one point of the map and drag the mouse to the second point. When you release the mouse, a red arrow will appear between the start and the stop point with the info about the distance in meters between those two points.
- **Add finish line:** this function allows you to put the finish line on the map; select the function from the map menu and then click somewhere on the map: there it will be placed the finish line. The cursor on the map will show the current size of the finish line. To move the finish line simply repeat the procedure as if you were placing a new finish line; the old one will disappear.
- **Add split:** this function allows you to add splits on the circuit. Splits must be crossed by all the laps and they must be placed in the correct order (i.e. do not place split n.3 spatially before split n.2, for example). In the Sessions/Laps table, one column for each split will be automatically

added. In case the split point does not belong to all laps or if it is in the wrong position, the corresponding field in the table will be highlighted in red as shown in figure 14.

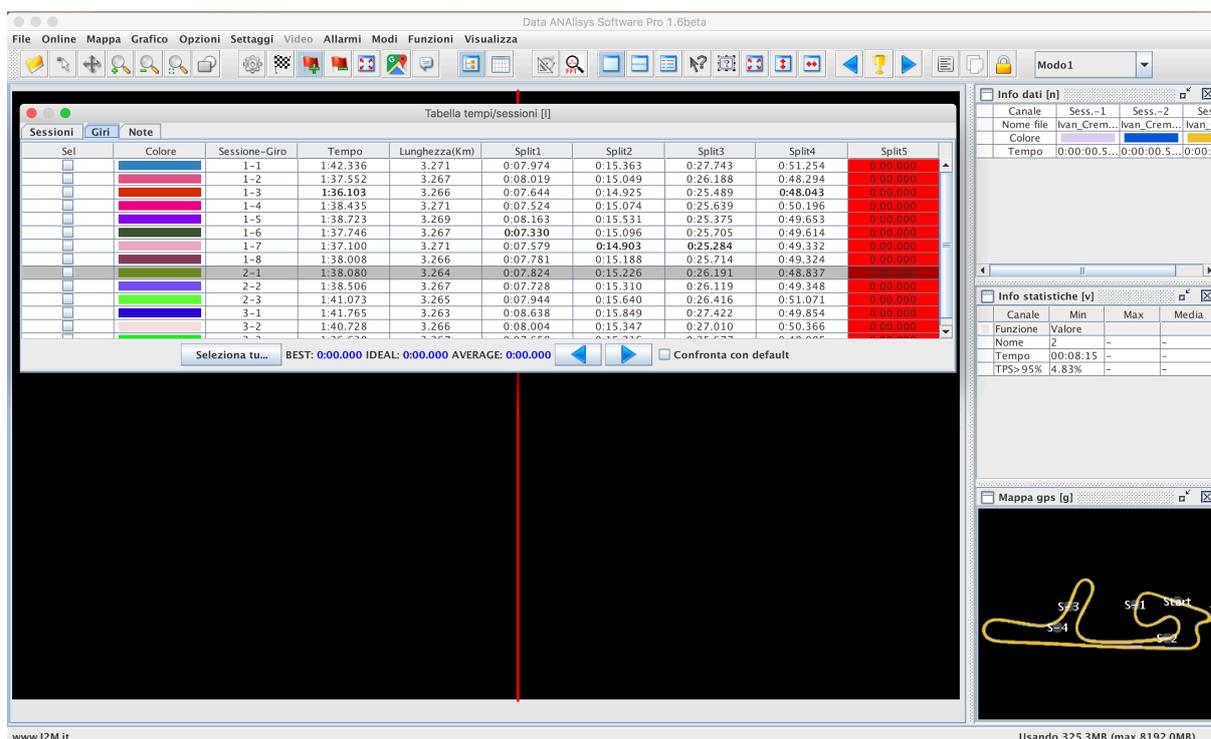


Fig. 14- Split n.3 is in the wrong place.

- **Remove Split:** it allows you to remove one of the splits: select this function and then left-click on the split that you want to remove.
- **Remove all markers:** remove all the splits and the finish line from the map.
- **Add/Update direction:** it allows you to associate a crossing-direction for each finish line and split. When you place a new finish line or a new split, the direction function is not active on that marker: this means that the finish line/split is crossed no matter the crossing direction of the laps. However, sometimes it might occur that the finish line is crossed also from the paths belonging to the straight, especially in case of strong interference on the GPS signal or when using big finish lines on relatively small circuits. To avoid these issues, it is possible to define the crossing direction of each marker on the map. Select the add/update direction function and then right-click on the marker of interest on the map; a horizontal crossing direction from west to east will be automatically added to the selected marker. When releasing the mouse, the arrow that indicates the direction will disappear, but it can be shown again by simply pointing the marker with the cursor. To change the direction, click on the arrowhead and drag it until the desired direction is obtained. Anytime the direction of a marker is added or modified, all the laps and the corresponding features will be refreshed. It is necessary to exploit this function to create finish lines that can be saved and used on the Chrome system.

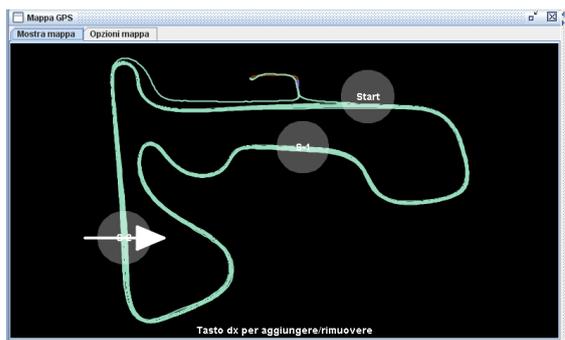


Fig. 15- Default direction added

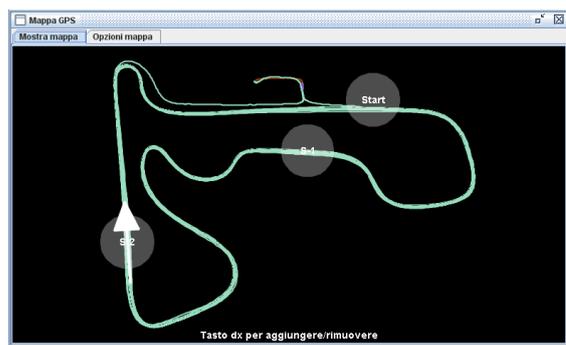


Fig. 16- Direction is customized

- **Load Finishing Lines:** it allows you to load a default or previously saved finish line. When selecting this function, a list of finish lines is shown: pick one and press the open button.
- **Save Finish Line:** this function allows you to save the current configuration in terms of splits and finish line, including directions. When selecting this function, the name of the circuit will be asked (max 8 characters); once saved, the circuit will be made available among the circuits that can be loaded. Overwriting an existing finish line is permitted.
- **Modify/create finish lines:** with this function you can manage all the finish lines that have been saved in Danas Pro. When choosing this function from the map menu, it will appear a window as shown in figure 17. On the left you can find the list of all the currently available finish lines in Danas. When you select a finish line, its info will be shown on the right side of the window, including name, coordinates and direction.



Fig. 17- List of finish lines

In the coordinates section, the N° field allows you to select the finish line or one of the splits, if present, to make its properties visible. The *Add* section allows you to add info on a new split that can be then added, or removed, by means of the Add/Remove split button. It is possible to modify all the info of each split and save them by means of the Save button.

The new and delete button (+ and – icons) you can add a new circuit or delete one of the circuits on the list. The buttons below the map allow you to zoom or move the map, or add a new finish line.

Create Laps Manually: if the GPS track is not available or if you want to create the single laps manually, you can use this function. It opens a window where you can select the time instant (related to the start of the session) for each lap. It is also possible to add or remove the laps created manually. The time instant can be selected also directly moving the cursor on the graph.

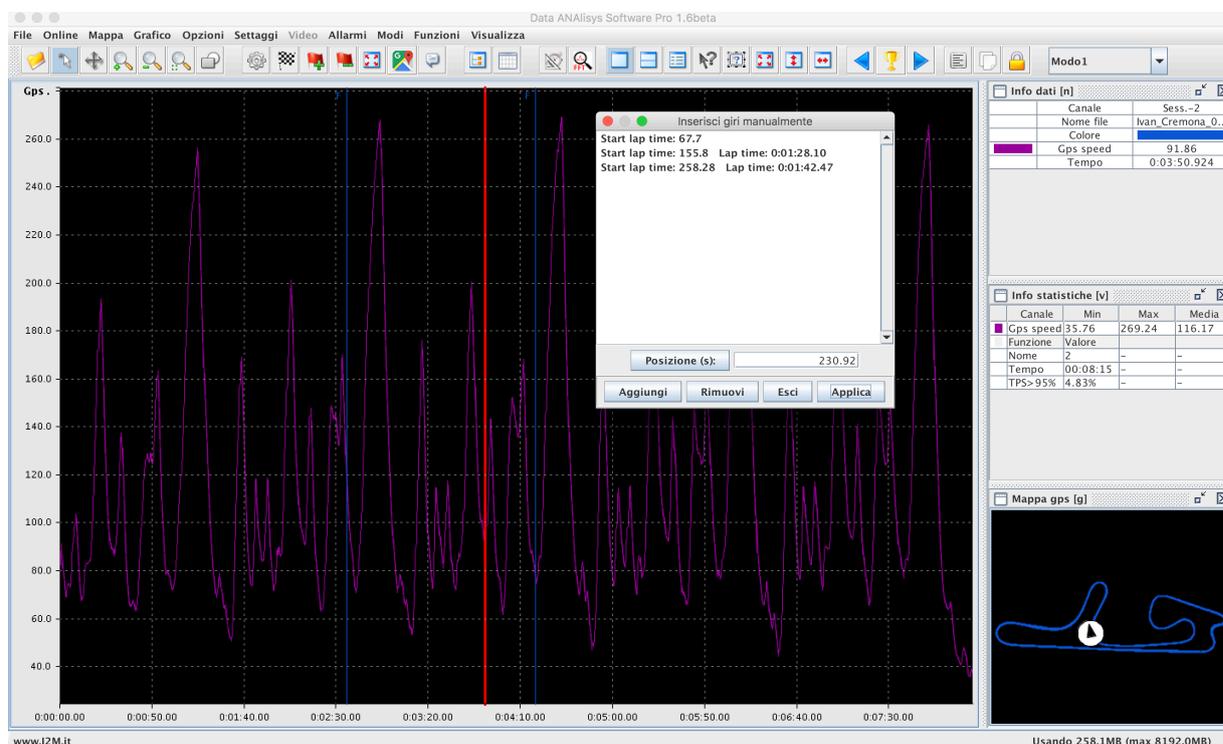


Fig. 18- Create Laps Manually Window (center right)

- **Find Finish Line:** this function allows you to choose if Danas should automatically place the finish line or not. If the corresponding box is checked, Danas will search among the saved finish lines the first one that is near the loaded data and it will place it automatically on the map. This function is active only when there are no other sessions and no finish lines.
- **Laps/Sessions:** it allows you to switch between session and laps modes.
- **Map/Options:** it shows the options in the map window.
- **Show data on the map:** this function allows us to identify some specific points on the map, as the maximum speed on the straight or the minimum speed in a turn, or the point of maximum dive or maximum spin. To this aim, Danas automatically computes the first and last point of a turn and the straight lines, then looking for the maximum and minimum values of some quantities as explained above. For each point, Danas shows a box with various local info. The boxes can be dragged anywhere by selecting the *move* mode.
- **Kind of data on the map:** this menu allows you to choose the kind of data that you want to show on the map; you can choose among minimum rpm or speed in a turn, the maximum speed in a straight, the maximum dive of the fork (analog2) or the maximum spin. It is also possible to select some customized data choosing both the circuit point and the channels as described in the following menu.

- **Customize positions:** this function allows you to choose the position on the circuit where you want to have an info box, while in the second tab you can select 5 channels to be shown in the info box. Data are always referred to the default lap.
- **Show graphic area on map:** activating this function the part of the track corresponding to the data displayed at that moment on the graph is highlighted on the map. The same function can be enabled and disabled by double-clicking on the map.

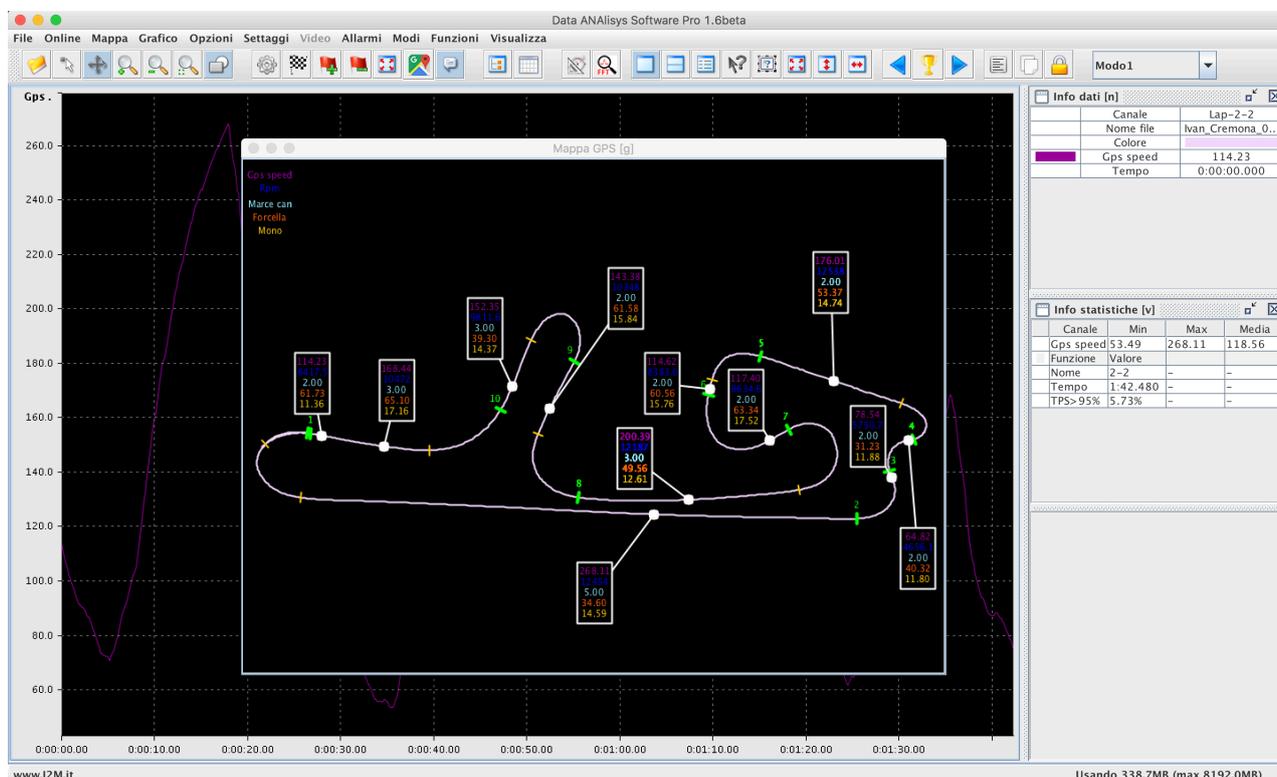


Fig. 19- Map with shown data on the map

- **Rotate map:** it allows you to rotate the map within its window.
- **Semitransparent Map:** it allows you to activate the transparency of the map window.
- **Set opacity:** it allows you to select the transparency level of the map.

THE GRAPH AND GRAPH MENU

From the *tools* menu, it is possible to select the Channels List; it is possible to invoke the same function also from the icon bar or using the space bar on the keyboard.

The channels list window shows the list of the channels that can be visualized; the channels featuring a name that starts with a *d* are derivative channels; for example, *dAnalog2* is the derivative of *analog2* channel.

On the top of the window, there is a search field: by inserting three or more characters, only the channels containing those characters in their names will be shown. The search is carried out on both the original name of the channel (e.g. *analog2*) and on the name given by the user or depending on a specific type of bike.

For each channel several options are available:

Position: it states if the channel must be represented in the upper or lower graph when the graph is split into two separate graphs (the graph split is discussed later in this section).

Show axis -A-: it specifies if the y-axis must be shown or not. This function allows you to save space by hiding the vertical axes. The number of axes that can be set for each graph is at most 4.

Show -V-: it specifies if the channel has to be shown or not.

Show info -I-: it states if the channel has to be shown or not in the info window. When a new channel is added, this option is automatically activated for it. It is also possible to show some channels only in the info window, to make it possible to read their values, but avoiding to show the relative graph.

Color: it states the color that is used for the corresponding channel when the option *colors divided by lap* is not active. By clicking on this field, it is possible to change the color associated to the channel.

Channel Name: it reports the name that the user can give to the single channel. The names that are shown in this field are extracted from the setting of the [default session](#). The names of the channels that can be set by the user can be modified by opening the settings of that particular session.

Clicking the *more* button it is possible to show all the options of the channels.

- **Line Width:** it allows you to choose among three different widths of the channel line by clicking on the corresponding icon.
- **Line style:** it allows you to choose among four different style for the channel line by clicking on the corresponding icon.
- **Minimum/maximum value:** it allows you to set the minimum and maximum y-axis value for the channel. These values are set automatically when the graphs are sketched and the *autoscaling* option is active.
- **Dn/Up %:** this function can be used only in the single graph mode; it provides an offset to the curves and it allows you to move them with respect to the other curves that are already present in the graph; the effect is similar to using a multiple graph but it saves the space needed for the axes. The value set in “Dn” is the percentage of space of the graph from where the minimum values of the curves will be placed; in the same way, in “Up” there is the percentage of space at which the maximum of the curves will correspond.

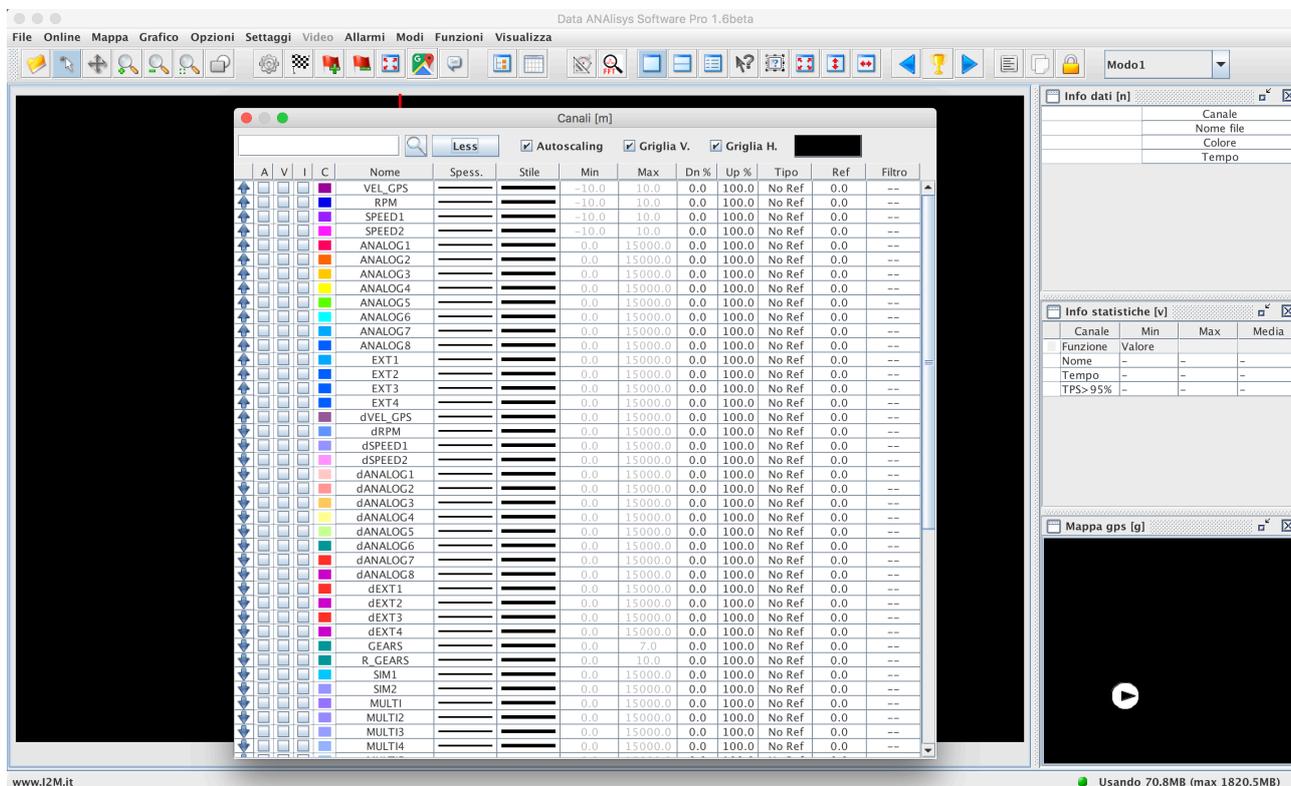


Fig. 20 – Channel list window

- **Type/Ref:** these two columns allow you to add a graph reference that will be shown as dashed line in the graph (the color of the dashed line will be the same color of the corresponding

curve). In the Type column it is possible to choose among “Min”, “Max”, “Avg” [for these options the Ref column is not required]; in the graph a dashed line will appear in correspondence to the minimum, maximum or (arithmetic) average value of the curve. When Type is equal to “Value”, instead, it is necessary to specify the value in the Ref column as well. A dashed line in correspondence to the chosen value will be shown in the graph.

- **Alarm Hi, Alarm Low:** for each channel it is possible to indicate a high and a low alarm. Enabling the display of the alarms (button with image of the bell) all the points above the high alarm and below the low alarm will be highlighted on the graph.
- **Filter:** it is possible to select the filtering frequency for each channel. As a result, a low-pass filter with a pole equal to the value in the filter field will be applied.

On the top of the window it is possible to activate/deactivate the autoscaling, the vertical or horizontal grid and to choose the background color.

By clicking on the horizontal axis, it is possible to modify its minimum and maximum values. Clicking on one of the vertical axes, it will be moved closer to the graph, while if it already is the closest axis to the graph, clicking on it, it is possible to change its minimum and maximum values.

From the graph menu, the following functions can be invoked:

- **Zoom In:** it gives you the possibility to zoom in the graph; a click on a point of the graph will cause the zoom of the area having as a center the selected coordinates.
- **Zoom Out:** it gives you the possibility to zoom out the graph; clicking on a point of the graph, the, it will be zoomed out keeping the selected coordinates as a center of the reduced image.
- **Window Zoom:** it activates the selective zoom option; select a rectangle on the graph, and it will be zoomed as much as need to occupy the entire window.
- **Move:** this function allows you to move the graph. You have to click on the graph and drag it. When moving the graph, you can zoom it in or out by simply scrolling the mouse wheel (if the scroll option is set to zoom).
- **Configure scroll:** it is possible to choose the function to associate the mouse wheel scroll. You can choose between horizontal translation or horizontal zoom. In any case, the zoom can be used pressing CTRL on the keyboard while scrolling the mouse wheel. If you press the SHIFT key while using the mouse wheel, you can zoom the graph vertically.
- **Add cursor:** this function activates a cursor on the graph. The cursor can be activated also with a double-click on the graph itself. In this mode, it is possible to activate a second cursor by moving the mouse while clicking the right button. If the *show selected info automatically* is active (see the *view* menu), the window of the selected info will automatically appear; it is shown in figure 11. The same window can be activated in the *tools* menu, as well as the second (reference) cursor can be activated from the icon bar.
The selected info window features a line for each visualized channel, plus the time and space lines for each visualized curve. For each line the value corresponding to the cursor is also available, as well as the value corresponding to the reference cursor, the difference (delta), the minimum and maximum values, the average and the derivative among the two cursors.
- **Show info on cursor:** if this option is active, the values of the curves where they intersect the cursor are shown on the cursor bar.
- **Simple/Double/Multiple Graph:** these functions allow you to choose the preferred visualization scheme for the graph. In simple mode, all the channels are overlapped within the same window; in double mode, the window is divided into two equal parts where the channels are plotted following the preferences indicated in the options panel; finally, in the multiple mode, each channel is plotted in a separate graph.

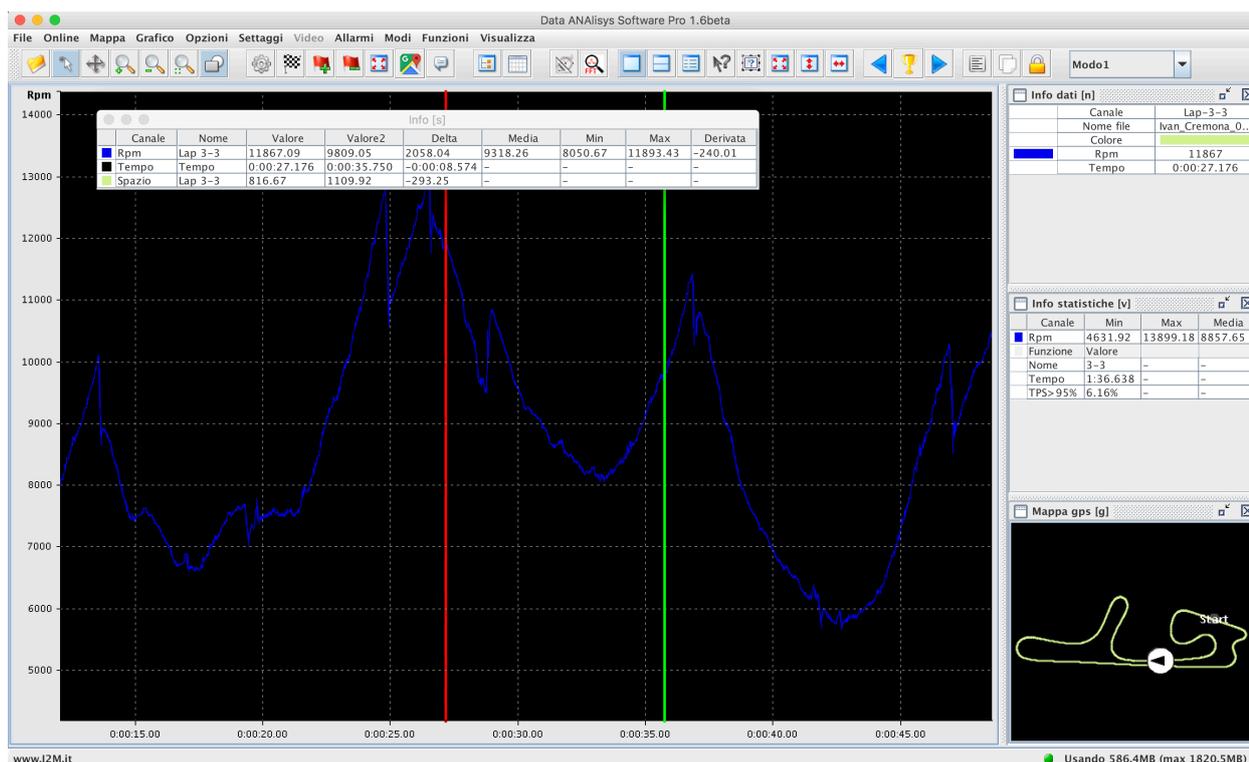


Fig. 21 – Selected info window

- Space/Time/FFT:** this function allows you to choose whether to represent the channels as a function of time, space or frequency (FFT).
ATTENTION: the space is computed referring to the [default session or lap](#) depending on what is currently shown on the graph. If more than one lap is shown, all the other laps are automatically shrunk/stretched to meet the length of the default lap. The more splits are present when this operation is computed, the more accurate the result will be (the normalization is computed for each split).
- FFT Options:** the window associated to this function is automatically shown when the FFT mode is activated. Among the options, you can choose the sampling window to avoid aliasing (please refer to text that explain the principle and the issues of FFT), you can choose among amplitude or power graphs and finally you can choose between linear and logarithmic axes.
- Fix/Release curves:** this option allows you to shift the curve of a lap with respect to another. Often (only in time and laps mode) it is useful to shift one curve with respect to another to align them not on the finish line but on another point, as the end of one of the turns, for example. By activating this option, once again the default lap is considered as a reference and it is always fixed. It is therefore possible to choose which laps we want to move. To this aim, first of all it is necessary to activate this option from the graph menu or from the padlock icon on the icon bar. When this function is activated, the system automatically switches to *move* mode and it makes all the laps that are currently selected able to move. It is possible to select a subset of laps to be moved either using the given function within the pop-up menu that can be activated with a right-click on the graph, or by clicking on the name in the corresponding line on the time table. In this way, the line will be highlighted in green and it will be possible to move the corresponding graph (if you click again the highlight will be removed). As anticipated, in the *move* mode indicated by the padlock it is possible to shift the laps with a right-click and drag instead of a left-click.
- Disaligne with sx/dx :** it is also possible to rapidly move the curves with this function that can be activated either from the icon bar (pages icon, shown in the center of Figure 22) or from the graph menu. This function allows you to shift the selected curves (highlighted in green) by

simply left-clicking the starting point and then right-clicking the end point. Finally, it is possible to align all the curves with respect to one of their splits by simply selecting the reference split and pressing the *align on a split* button on the icon bar.

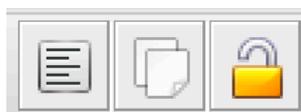


Fig. 22 – Button to align on a split, disaligne with sx/dx and unlock button

- **Laps/Sessions:** these options allow you to choose between laps or sessions that you have selected in the main table and show one or the other in the graph.
- **Math channels:** Danas Pro allows you to create math channels in several ways. The option *configure math channels* opens the configuration window of math channels. In this windows you can configure a set of ten math channels. Two lists of available functions and available variables are present: you can use them to write the expression of a new math channel. Among functions, for example, the IF operator is available; the syntax of this function is *IF(condition, then, else)* meaning that its output value will be equal to *then* in case the *condition* is met, otherwise the output will be *else*. For example, if we write *IF((rpm>5000,100,0)*, the function will return 100 anytime rpm exceeds 5000, otherwise it will return 0. It is possible to associate a name to each math channel; the chosen name will be used to identify the math channel in the channels list.
- The user functions can be saved and loaded, and when the software is running it is possible to give a name to each function: the name will be shown in the info table or on the graph axis.
- If the available functions are not enough, it is possible to replace any function with a Java script. Using the *edit script* function, it is possible to write a script starting directly from the value of the channels and manipulating them as preferred.

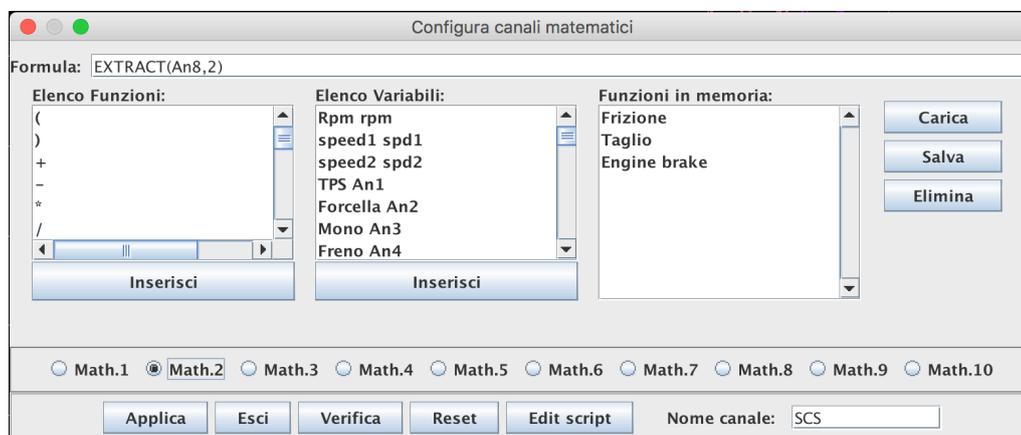


Fig. 23 – Configure math channels window

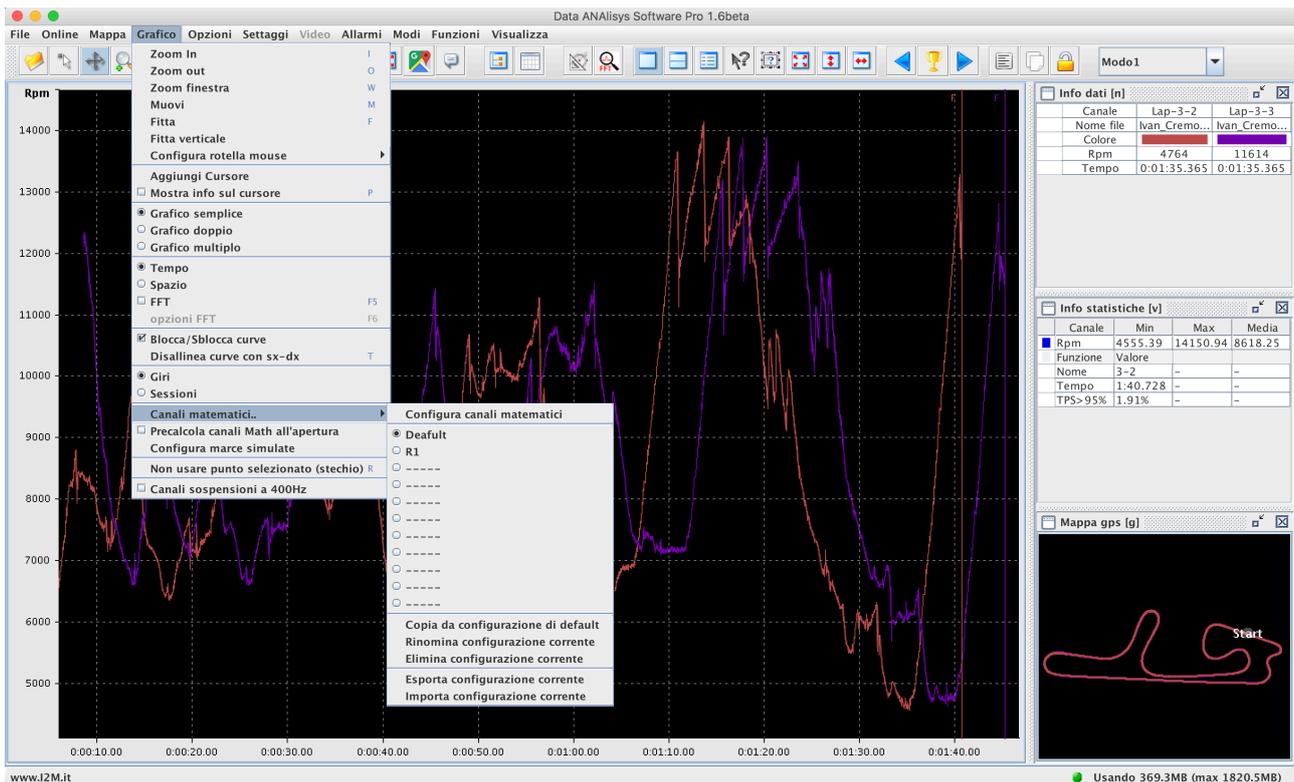


Fig. 24 – Math channels sub-menu

The 10 math channels that have created with the math channels configuration menu can be saved in a configuration with a name. It is possible to create up to 10 different configurations; each one can be renamed, copied, deleted, as well as exported or imported. The currently active configuration will be associated to any mode when it is stored.

- **Precalculate math channels on open file:** typically, a math channel is computed the first time that the channel is shown. It is also possible to pre-calculate all the math channels upon the opening of any file.
- **Configure gear simulation:** gear simulation can be very useful if you need to change the ratios of the gears and see how they would impact in the circuit travelling.

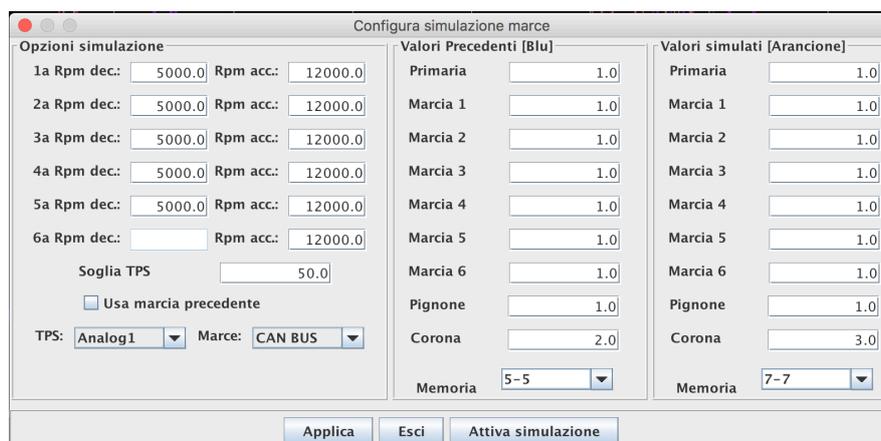


Fig. 25 Configure gear simulation

First of all, you need to select the channels on which TPS and GEARS have been acquired, by using the corresponding fields at the bottom left of the menu shown in figure 25.

Center and right sections allow you to set the gear ratio for each gear, both the current ratios and the simulated ones, and you can set the current and the simulated values of sprocket and crown. In case you only want to change the gear ratio, but not the other parameters, it is possible to keep all the default gear values as long as there are the same values in the *previous* and *simulated values* fields.

The left section is the most delicate one: it is used to set the maximum allowed RMP during acceleration and deceleration, in order to allow the program to identify which gear has to be simulated. For each gear, the RPM in acceleration is the maximum allowed value for RPM; above this threshold, the software will use the next higher gear. The gear that will be set by the software during simulation is the lower one compatible with the RPM limits.

RPM in deceleration correspond to the maximum allowed value for the engine-braking effect. During deceleration, the software will select the lowest gear compatible with the engine-braking given by the RPM values.

The TPS threshold is the one used to discriminate between accelerations and decelerations. Once you have set all the fields according to your need, you can apply the new settings by clicking the *Apply* button. It is then sufficient to visualize on the graph the two channels corresponding to simulated gears and rpms.

- **Don't use selected point (stoichiometric):** this function allows you to discard the point that is currently selected by the cursor from the computation of the stoichiometric table (see tools menu).
- **Suspension channels at 400Hz:** By choosing this option, the channels referring to suspensions (analog2 and analog3) will be visualized at 400Hz making it simpler to visualize possible high-frequency oscillations (chattering).

DANAS OPTIONS AND OPTIONS MENU

The *options* menu allows you to configure some Danas options; among these options we have:

- **Offset GPS:** it is possible to configure the temporal skew between the data collected by means of the GPS and the analog/digital data acquired with another reference. This value is set to zero by default and it must be changed only if GPS receivers have a transmission delay.
- **Import/Export/Delete preferences:** These functions allow you to manage some Danas settings as, for example, the position of windows, which windows have to be visualized and so on. All the preferences are saved in a xml file that can be deleted (to reset Danas), or imported/exported to allow the transfer of preferences from a PC to another, for example.
- **Set single lap as default:** the default lap is a key parameter to properly visualize the info on the map and on the graph or on the windows relating to info and statistics. By enabling this function when a single lap is visualized, that lap is automatically set as default lap.
- **Close broken laps:** sometimes it happens that a lap is not finished, because of a fall of the bike, for example; a broken lap cannot be plotted over other laps. With this function, you force the broken lap to be finished so that it can be compared with the others.
- **Select first/last session on start up:** these functions allow you to choose whether you want to automatically select the first and/or the last session upon the opening of a new file, in order to automatically visualize the corresponding graphs if these have already been selected.
- **Auto change colors with more than one lap:** different curves on the graph, corresponding to different channels, can have two different color styles. In one case, the color of each curve is set on the basis of its relative channels, that is there will be one color for

RPMs, another one for GPS speed and so on. Each color can be selected in the channel list window. In alternative, it is possible to associate one color to each session/lap, that is all the curves of a given lap will have the same color, which can be selected in the sessions/laps table. With this function, the system automatically selects the coloring option depending on whether one or more laps are shown. When a single lap is shown, different colors are associated to different channels, while when more than a lap is shown, each color corresponds to a single lap.

- **Use fixed colors for laps:** by enabling this function, the first five laps displayed each time assume predefined colors regardless of the color that has been assigned to them in the table. This makes it easier and more standard to make comparisons between different laps.
- **Configure fixed colors:** through this window you can choose the color to be assigned to the first five laps displayed.
- **Write log file:** enabling this function, Danas writes on a log file (*DanasPro.log*) that is within the Danas folder. In case of errors, failures or system crash you can send the log file to support@i2m.it to facilitate the problem solving.
- **Save laps automatically:** enabling this function, manually created laps will be saved in the data file.
- **Configure shortcut:** This function allows you to open the window shown in figure 26; it allows you to customize the shortcut of Danas functions. For every function, a menu allows you to choose if you want to configure a shortcut and the key combination that you want to use to activate that particular function. The system will notify you if you try to use the same shortcut for more than one function (option denied).

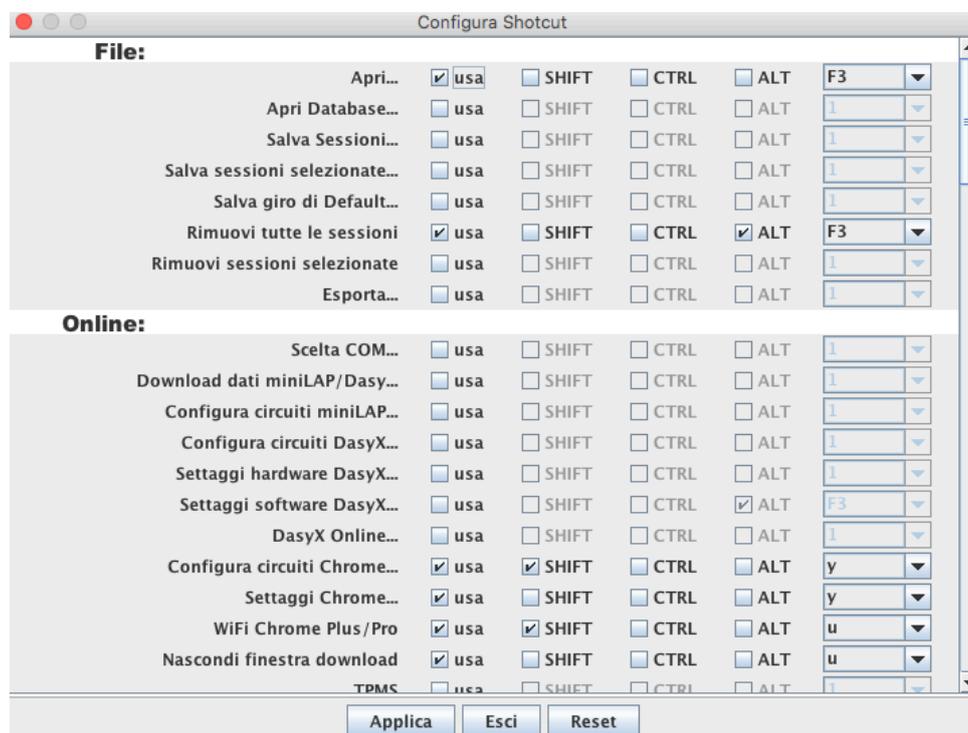


Fig. 26 –shortcut window

SETTINGS MENU

In the settings menu, we have two options relating to the Chrome: the DDS dynamic settings and the generic Chrome settings.

DDS

Dynamic settings allow you to set different bike parameters (on some bikes as the ZX10R 2016 and the R1 15-19) for each sector of the circuit.

This function can be enable only in laps mode and when a default lap is selected. Thanks to the window shown in figure 27 it is possible to split the default lap (used as a reference) into a custom number of sectors. You only need to go to the graph, point the cursor on the position of the sector that you want to add and click *Add*; a new sector will be added using the parameters that you set on the drop-down menus within the DDS window.

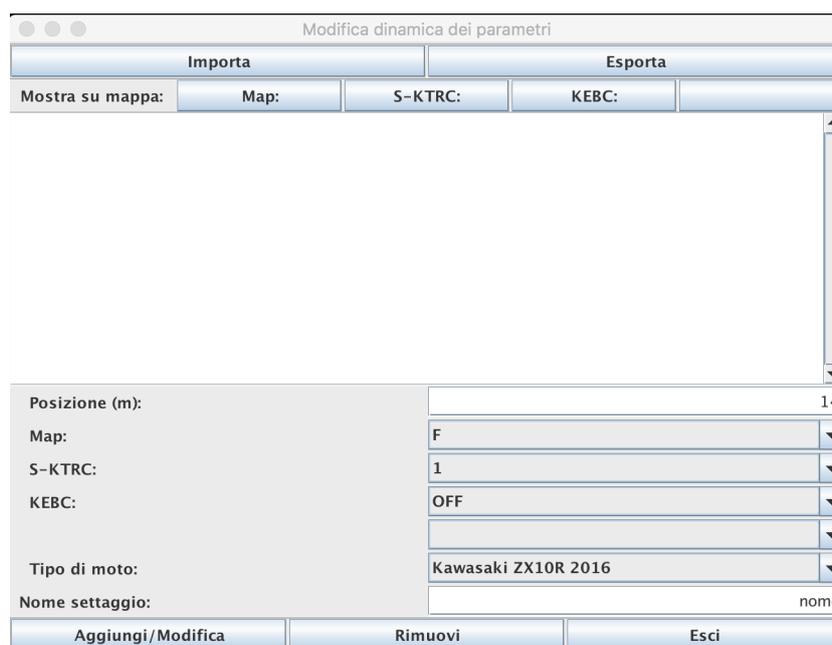


Fig. 27 –DDS dynamic settings window

In case you want to modify a sector, you simply have to select it in the window: the cursor will be moved toward the correspond position and it will be possible to modify its parameters and then confirm the new settings by clicking the *modify* button.

It is also possible to graphically see the chosen settings for each sector directly on the map, by clicking the button corresponding to the parameter that you want to see at the top of the window.

When the setting is finished, it is necessary to save the file on a USB key so that you can import it on the Chrome.

Chrome Settings

The Chrome settings window allows you to configure your Chrome by replicating all the current settings and to import the on you Chrome by using a USB key (by import/export of settings) or using WiFi in case you have a Chrome Plus or Pro (a connection between Danas and Chrome is required).

ALARMS MENU

The alarms menu allows you to run some tests on selected sessions. There are two default alarms, that are relative to the water temperature and the battery level. In the first case, the temperature of the water is monitored checking if it exceeds a given threshold, while in the second case the battery level is monitored checking if its voltage becomes lower than a given threshold. The alarm thresholds can be configured with the *configure alarm* function as shown in figure 28. This function also allows you to create two additional alarms where you can choose not only the alarm threshold but also the combination of channels to be monitored. It is also possible to select a minimum time interval for

which the condition has to be verified (e.g. the alarm is generated if the water temperature is over the threshold for at least the selected time interval).

The option *execute at start up* allows you to choose if you want to automatically run the test upon the opening of a new session, while the *show only if failed* option allows you to be notified only if the test run at start up has failed.

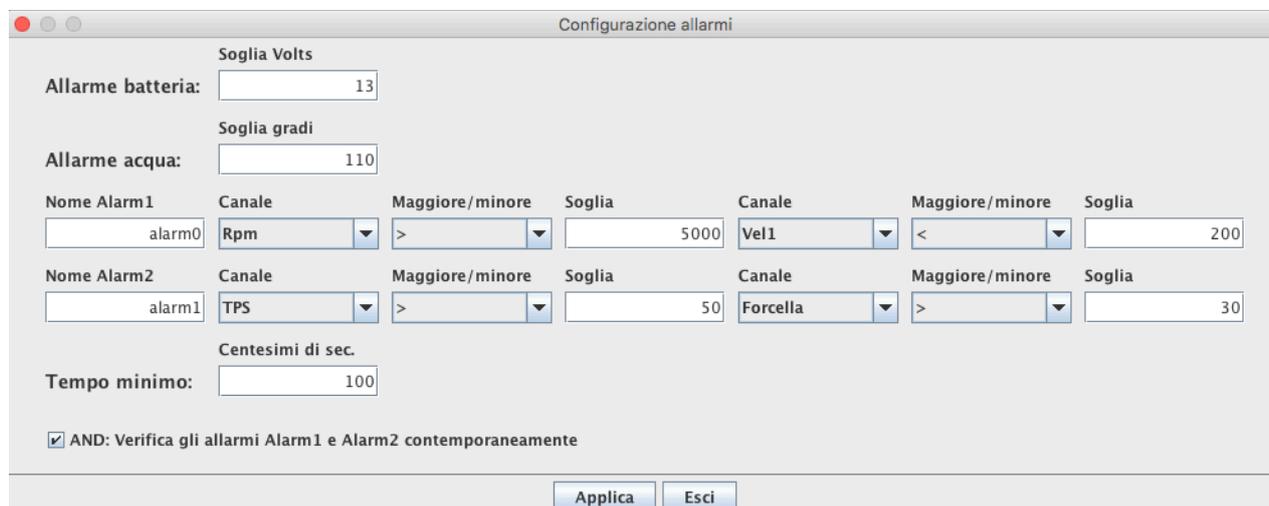


Fig. 28 – Configure alarm window

THE VIDEO MENU

The video menu allows you to manage the synchronization of videos linked to the acquired sessions. In the sessions tab of the sessions/laps table it is possible to associate a video file (MP4 file) to each session by simply click on the video button on the line corresponding to the session of interest.



Sel.	Colore	Sessione	Filename	Data	Start	Trascorsi	Distanza(Km)	Giri	Best	Pilota	Tipo	Video	Settings HW
<input type="checkbox"/>		1	Ivan_Cremo...	2018/10/06	09:42:33	00:16:39	32.37	8	1:36.103	Ivan	Test		
<input type="checkbox"/>		2	Ivan_Cremo...	2018/10/06	12:01:50	00:08:15	16.0	3	1:38.080	Ivan	Test		
<input checked="" type="checkbox"/>		3	Ivan_Cremo...	2018/10/06	12:10:11	00:06:59	13.05	3	1:36.638	Ivan	Test		

Fig. 29 – Sessions tab of the sessions/laps table

The video menu can be activated by checking the *show video* option in the *tools* menu. At the opening of the video window, the video of the default session (or default lap in case you are in laps mode) is automatically loaded. By switching between the laps and the sessions mode, the video automatically is automatically switched between the one related to the default session and the one related to the default lap. The video menu allows you to:

- **Load video:** manually select a video to be loaded
- **Zoom 100% / 50%:** select the zoom level. It is also possible to resize the video window as you prefer.
- **Offset video/video compare:** in case videos are not aligned with data, it is possible to align them using these functions, which allow you to set a temporal offset between the beginning of the video and the beginning of the session.

It is also possible to activate another video as a comparison by checking the *show compare video* option in the *tools* menu. In this way, it is possible to compare two laps either belonging

to the same session or to different sessions. In order to select the second lap (the first one is always the default lap) you only need to go on the laps tab of the sessions/laps table and right-click on the lap that you want to use. A drop-down menu will allow you to choose that lap as comparison lap.



Sel	Colore	Sessione-Giro	Tempo	Lunghezza(Km)
<input type="checkbox"/>		2-1	1:38.080	3.264
<input type="checkbox"/>		2-2	1:38.506	3.267
<input type="checkbox"/>		2-3	1:41.073	3.265
<input type="checkbox"/>				3.263
<input type="checkbox"/>				3.266
<input type="checkbox"/>		3-3	1:36.638	3.267

Seleziona 2-3 come giro default
Seleziona 2-3 come giro di confronto video

Seleziona tu... BEST: 0:00.000 IDEAL: 0:00.000 AVERAGE: 0:00.000 Confronta con default

Fig. 30 – Selection of a comparison lap to compare two videos

THE MODES MENU

Danas allows you to save up to 20 configurations. In each configuration you can choose which channels you want to visualize each one with its scale and color, how to divide the graphs, which math channels have to be used and so on.

In this way it is possible, for example, to create one configuration for the analysis of suspensions, one for the engine and so on. It is possible to choose the mode both from the modes selector in the icons bar and by using a key.

In the *modes* menu we have the functions associated to these configurations:

All'interno del menù *modi* troviamo le funzioni associate a queste configurazioni:

- **Save current mode:** it allows you to save the current configuration of the mode.
- **Rename current mode:** it allows you to rename the mode.
- **Duplicate current mode:** it allows you to duplicate the current mode and save the time in case of similar modes.
- **Export/import mode:** it is possible to export and import the single configuration to allow you to move it from one pc/user to another.

Within this menu, we also find the reset windows positions function which allows you to reset the saved position of each window (as the map window, for example). This function can be useful when an external additional monitor is used and, when coming back to a single monitor some windows are no more visible.

THE TOOLS MENU

This menu allows to enable several Danas functions.

- **Show video:** it enables and opens the video window related to the default session/lap.
- **Show compare video:** it enables and opens the window related to the second video for comparison.
- **Show channels list:** it opens the window that shows the channels and their options; please refer to the graph section for more details.
- **Show info/selected channels info:** these functions allow you to immediately have the x-axis value of the curves shown on the graph corresponding to the cursor position. In the info window (that can be either placed near the graph or in a completely autonomous window) it is possible to visualize the channels that have been selected in the "Show info" column of the graphs curves options tab (overview tab in the main window). Values are sorted by columns, one for each curve, so that they can be easily compared. If a line of the window is clicked, it is highlighted in grey and the corresponding curves are shown in bold.

The selected channels info window instead can be shown only as independent window and it shows only the channels that are visible on the graph.

The info of these channels include the values corresponding to the cursor, the values of the second cursor (that can be selected from the icons bar or by right-clicking and dragging the main cursor), the difference between the two values, the maximum, minimum and average value among these two values.

- **Show statistics:** the statistics window refers exclusively to the default curve, that is either a session, if we are in sessions mode, or a lap in case we are in laps mode. For each channel having the info option checked (which is not necessarily a shown channel) you will see the minimum, maximum and average value in the statistics window. At the bottom of the window you can find the name of the session/lap to which the statistics are referred, its duration and the time percentage for which the gas (Analog1) has been higher than 95%. By choosing one of the fields relating to the minimum or maximum of one of the channels, the cursor will be automatically placed in the first point of the curve having the selected value and a circle will be placed identifying both the position and the value. By clicking on the average field of a channel, instead, a dashed horizontal line will appear on the graph corresponding to the average value of the selected curve.

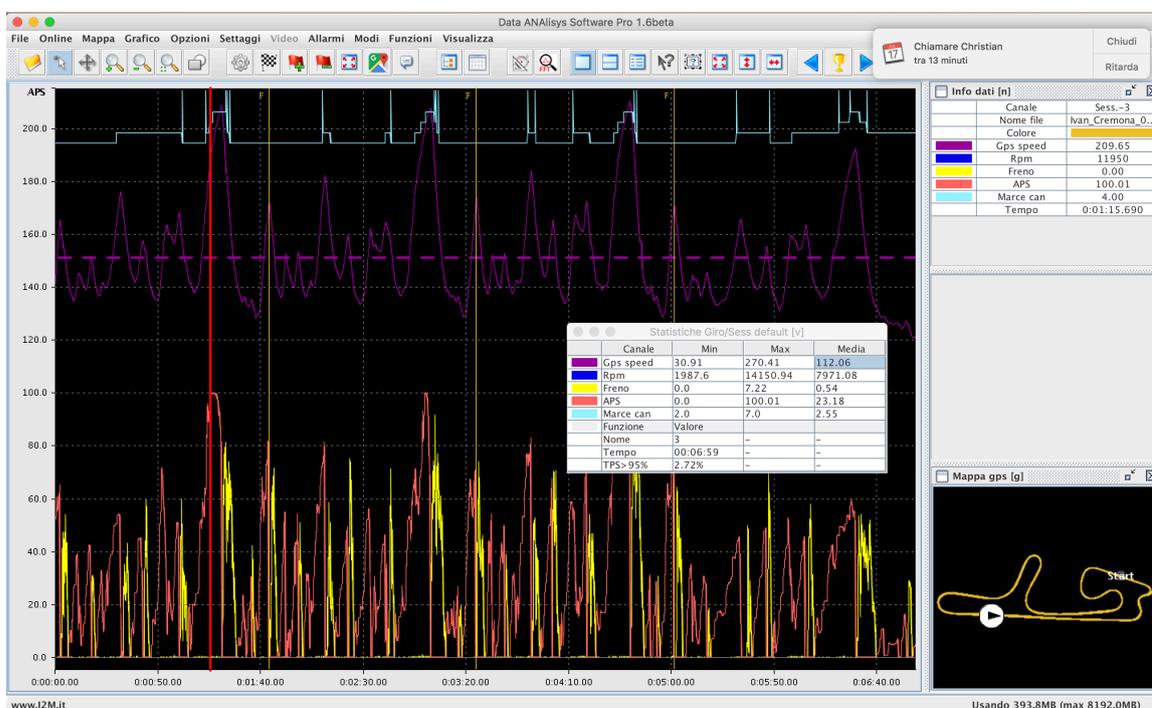


Fig. 31 – Statistics window with highlight on the average value of the GPS speed

- **Show stechio table:** this function allows you to analyze the carburation if one channel corresponding to a lambda sensor plus TPS and RPM data are available.

Tabella	Obiettivo	Correzioni	Opzioni							
TPS	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000
10%	13.86	14.29	14.68	15.42	15.54	14.80	13.41	13.63	13.62	
20%	11.90	12.11	12.39	12.49	12.70	13.23	13.13		12.91	
30%	11.70	11.22	11.50	12.38	13.22	13.22	12.50			
40%	11.73	11.93	11.64	13.23	13.98	13.83	12.96			
50%		12.23	12.63	13.18	14.05	13.95	14.01			
60%		12.06	12.59	13.45	13.52	13.56	13.69			
70%		12.04	12.51	13.27		13.61	13.46	13.11		
80%		12.51	12.50	13.30	14.28	13.51	13.43	13.14		
90%		12.46	12.87	13.09		14.02	13.53	13.32		
100%			12.66	13.10	13.38	13.12	13.12	13.06	12.97	

Fig. 32 – standard stochiometric table

The first step requires to set the options for the computation in the “Options” tab

CANALI Canale TPS: Canale Lambda:
ESTREMI Valore minimo RPM: Valore massimo RPM:
PASSO Passo RPM: Imposta manualm...
COLORI Verde: Rosso:
CELLA Includi se : inferiore al valore
DECELERAZIONE TPS Maschera [cent.]: Offset TPS [%]:
DECELERAZIONE RPM Maschera [cent.]: Offset RPM [giri/min]:
LIMITATORE Maschera [cent.]: RPM [giri/min]:
AFR Maschera [cent.]: AFR [valore]:
POMPA RIPRESA Maschera [cent.]: POMPA RIPRESA [%/s]:
CAMBIATA Maschera [cent.]:
MEDIE Numero minimo camp...

Fig. 33 – carburation analysis options

TPS and Lambda channels where data have been acquired have to be specified in the dedicated fields. Then, *Limits* and *Step* allow you to define the grid for the stochiometric analysis: in this way a custom grid is defined having regular intervals as the one shown in figure 32.

In case your control unit requires particular intervals (as for a ZX10R for example) you can use a specific file to be imported using the dedicated flag “set manually”; the file must have two lines with the y- and x-axis values, respectively, separated by commas; for example, for the ZX10R we can have:

```
1, 2, 5, 8, 10, 15, 20, 30, 40, 50, 75, 100
2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000, 11000, 12000, 12500, 13000, 13500
```

As a result, the stochiometric table reported in the figure below is obtained:

Tabella	Obiettivo		Correzioni				Opzioni							
TPS	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	12500	13000	13500
1%	13.52	13.20	14.37	14.34	14.39	14.47	14.89	15.34	15.18	14.33	13.57	13.50	13.57	12.35
2%	13.53	13.10	14.28	14.37	14.26	14.25	14.70	15.18	15.11	14.27	12.49	11.83	12.09	
5%	13.22	13.68	13.20	13.61	13.78	13.96	14.38	14.92	16.09	13.43		10.99		
8%		13.12	13.16	13.26	13.15	12.84	13.28	13.71	13.43	12.71				
10%		11.74	12.51	13.17	12.96	12.82	12.85	13.26	13.26	12.81	10.49			
15%		12.81	12.52	13.01	12.68	12.19	12.73	13.50	13.48	13.33	13.48	10.15		
20%	13.14	13.16	12.40	13.17	12.37	11.96	12.20	12.90	13.22	13.26	13.05		12.26	
30%	13.01	13.41	12.83	13.03	12.23	11.73	12.02	12.69	13.35	13.17	12.73	12.19		
40%	13.10	13.18		14.34	12.86	12.32	12.60	13.44	13.86	13.84	13.27	12.97	12.76	
50%	12.86	13.23	12.94	14.98	12.89	12.46	12.80	13.32	13.84	13.93	13.71	12.94	13.09	13.14
75%		13.20	13.26		12.90	11.98	12.73	13.08	13.69	13.76	13.67	13.28	13.14	12.94
100%		13.08	13.47			11.92	12.56	13.22	13.78	13.60	13.36	13.26	13.16	13.08

Fig. 34 – Stechiometric Table for ZX10R

Continuing with the configurations, you need to set:

- **COLORS:** set the values of AFR or λ corresponding to pure green and red (intermediate shades are automatically computed).
- **CELL:** check the “include if less than cell’s value” when you want to consider only the values up the limit set in the header. For example, if in the column 3000 rounds/min you want to see all values in the range from 2000 to 3000, then you need to check the box; otherwise, you have to uncheck the box if you want that the column contains the value in the range from 3000 to 4000.

It is also possible to apply some filters to improve the analysis: if you want to discard some spurious events in correspondence to some events as accelerations or decelerations, you can decide to ignore some hundredths of second following the event.

For example, referring to figure 35, we have:

DECELERAZIONE TPS	Maschera [cent.]:	20	Offset TPS [%]:	5
DECELERAZIONE RPM	Maschera [cent.]:	20	Offset RPM [giri/min]:	200
LIMITATORE	Maschera [cent.]:	20	RPM [giri/min]:	14500
AFR	Maschera [cent.]:	20	AFR [valore]:	18
POMPA RIPRESA	Maschera [cent.]:	0	POMPA RIPRESA [%/s]:	80
CAMBIATA	Maschera [cent.]:	20		

Fig. 35 – filter configuration for the analysis of carburation

- Following a deceleration sensed by TPS and equal to a 5% of variation, the samples corresponding to the following 20 hundredths of second will be discarded.
- Following a deceleration sensed by RPM and equal to a variation of 200 rounds/min, the samples corresponding to the following 20 hundredths of second will be discarded.
- Following the activation of the limiter, equal to 14500 rounds/min, samples corresponding to the following 20 hundredths of second will be discarded.

- Following the AFR exceeding 18, samples corresponding to the following 20 hundredths of second will be discarded.
- Following a Pump Recover no sample will be discarded.
- Following a change of gear, samples corresponding to the following 20 hundredths of second will be discarded.

The last parameter to be set is the minimum number of samples to consider in order to compute a meaningful average; if the number of available samples is lower than the specified value, the corresponding field will have no value and it will be highlighted in grey.

Once the desired settings have been specified, go back to the Table tab and click on the “Recompute” button in order to make the new settings effective on the computed values.

By clicking the “Show on graph” button, in the graph it will be highlighted the set of points that contributed to the computation of the value in the selected field (which will be highlighted in yellow).

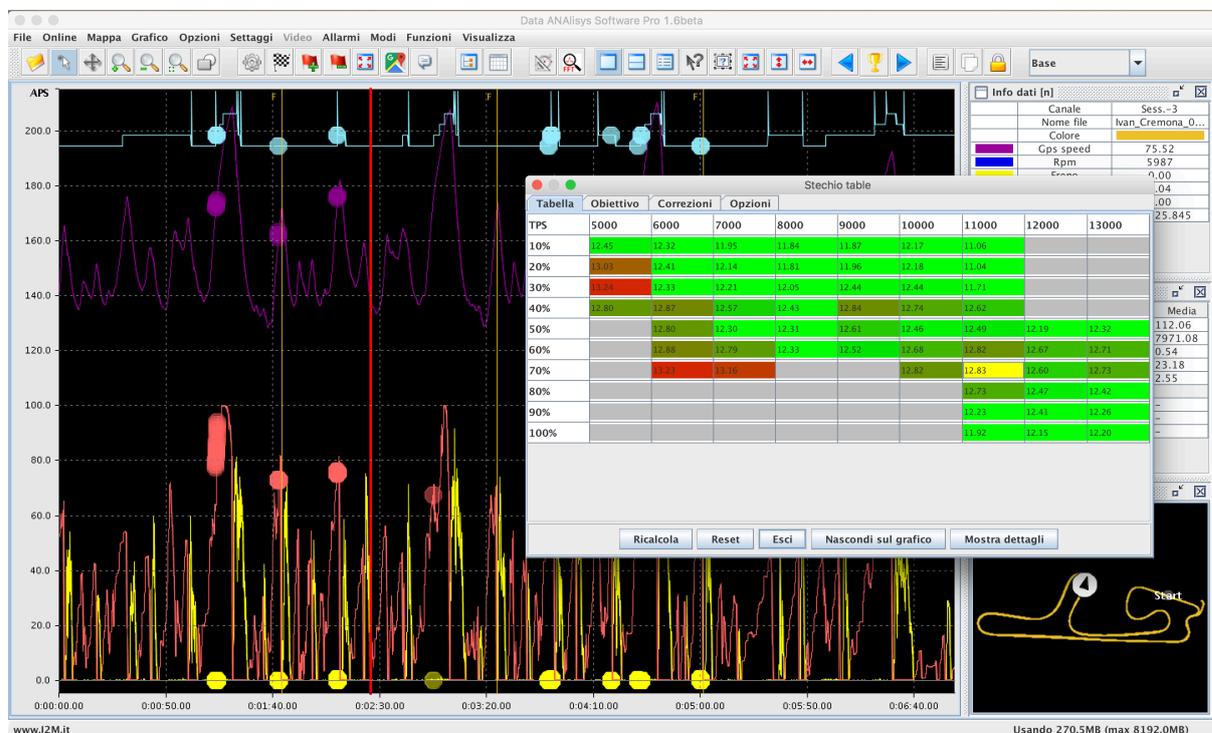


Fig. 36 – Values shown on the graph for the field corresponding to 6000rpm and 10%

For an even more detailed analysis, you can use the “Show details” option that shows, for each selected entry of the stechiometric table (highlighted in yellow), the list of all point that contributed to the computation of the value, including both the exploited and the discarded points.

It is also possible to analyze the single points and decide to add or discard them; the count will be automatically updated.

Tabella	Obiettivo	Correzioni	Opzioni											
TPS	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	12500	13000	13500
1%	13.51	13.19	14.36	14.34	14.39	14.47	14.89	15.34	15.18	14.35	13.58	13.51	14.12	12.95
2%	13.51	13.10	14.28	14.37	14.26	14.26	14.70	15.18	15.11	14.42	12.64	11.83	12.54	
5%	13.05	13.59	13.19	13.61	13.78	14.04	14.38	14.82	16.09	13.22				
8%		13.12	13.16	13.28	13.15	12.95	13.28	13.76	13.43	12.55				
10%		11.74	12.47	13.17	12.95	12.81	12.85	13.24	13.28	12.81				
15%		12.81	12.52	13.01	12.98	12.19	12.75	13.49	13.48	13.34	13.48			
20%	13.14	13.16	12.98	13.17	12.97	11.95	12.18	12.85	13.21	13.25	13.05		12.25	
30%	13.01	13.45	12.78	13.03	12.23	11.71	12.01	12.58	13.35	13.18	12.75	13.14		
40%	13.10	13.21		14.34	12.85	12.32	12.60	13.44	13.85	13.84	13.26		12.77	
50%	12.85	13.23	12.94	14.99	12.69	12.46	12.79	13.97	13.84	13.93	13.71	13.12	13.70	12.86
75%		13.19			12.90	11.98	12.73	13.08	13.69	13.76	13.68	13.28	13.14	12.95
100%		13.08	13.47			11.92	12.95	13.22	13.78	13.60	13.96	13.26	13.70	13.68

Fig. 37 – Detail for the entry corresponding to 13000rpm and 20%

In the “Goal” Tab you can set the parameters of the ideal sthechiometric table by manually inserting the values. To facilitate its use afterwards, the goal table can be saved by means of the dedicated button “Save goal table” and it can be later recalled using the button “Open goal table”.

Tabella	Obiettivo	Correzioni	Opzioni											
TPS	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	12500	13000	13500
1%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
2%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
5%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
8%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
10%	12.8	12.8	12.8	12.8	12.8	13	12.8	12.8	12.8	12.8	12.8	12.9	12.8	12.8
15%	12.8	12.8	12.8	12.8	12.9	12.8	12.8	13	12.8	12.8	12.8	12.8	12.8	12.8
20%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
30%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.9	12.8	12.8	12.8	12.8	12.8
40%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	13	12.8	12.8
50%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
75%	12.8	12.8	12.8	12.8	13	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
100%	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8

Fig. 38 - Goal table

Once the goal is set, if the “Compute corrections” button is pressed, in the Corrections tab you will find the corrections that have to be applied to achieve the goal.

Tabella	Obiettivo	Correzioni											Opzioni	
TPS	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	12500	13000	13500
1%	+5	+3	+11	+11	+11	+12	+14	+17	+16	+11	+6	+5	+9	-4
2%	+5	+2	+10	+11	+10	+10	+13	+16	+15	+11	-1	-8	-2	
5%	+2	+6	+3	+6	+7	+9	+11	+14	+20	+3				
8%		+2	+3	+3	+3	+0	+4	+7	+5	-2				
10%		-9	-3	+3	+1	-3	+0	+3	+4	+0				
15%		+0	-2	+2	-2	-5	-1	+4	+5	+4	+5			
20%	+3	+3	-3	+3	-3	-7	-5	+1	+3	+3	+2		-4	
30%	+2	+5	-0	+2	-5	-9	-7	-2	+3	+3	-0	+3		
40%	+2	+3		+11	+0	-4	-2	+5	+8	+8	+3		-0	
50%	+0	+3	+1	+15	+1	-3	-0	+4	+8	+8	+7	+2	+2	+1
75%		+3			-1	-7	-1	+2	+7	+7	+6	+4	+3	+1
100%		+2	+5			-7	-2	+3	+7	+6	+4	+3	+3	+2

Fig. 39 – Corrections to be applied

The corrections values are computed as follows:

$$\text{correction} = (\text{present-goal}) / \text{present} * 100$$

thus reporting the percentage error.

- Show XY graph:** XY graphs, unlike normal graphs, allow you to select one channel for the X axis and one channel for the Y axis (plus a channel for the Z axis, that is the color). In this way, it is possible, for example, to draw the speed as a function of the RPMs obtaining the distance between gears and, implicitly, the use of the gearshift. This function can be only used on the single lap. The options allow you to select the channels, the scales, if you want to show the grid or not, if you want to use all the points of a lap (slow analysis) or if you want to decimate your data to speed up the analysis. Finally, it is possible to save up to 20 configurations that can be rapidly recalled.

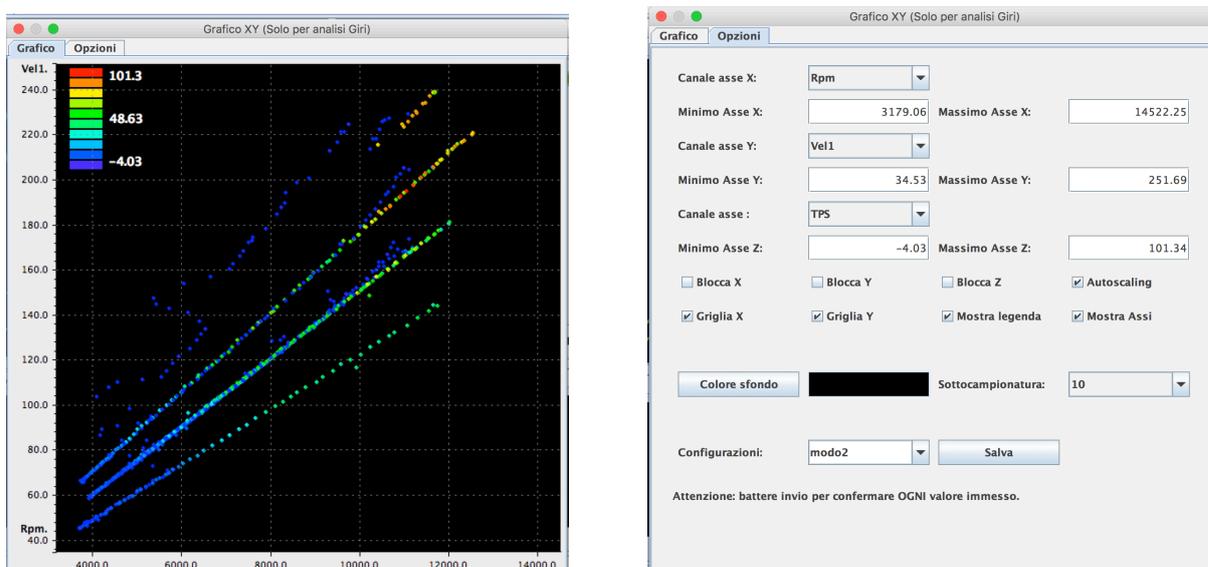


Fig. 40 –XY Graph ant its options

- Histograms:** this function allows you to create one or more histograms relative to the channels. Using *open new histogram* allows you to create a new histogram as shown in figure 41. The options tab allows you to configure the channel that you want to histogram, the minimum and maximum values of your interest, the maximum value of the Y-axis of the histogram and finally the number of steps that you want to use to compute the histogram. The *autoscaling* functions automatically sets the full scale ranges. In case of histograms related to the sessions, the remove edges option allows you to discard the first and the last lap of the session. Histograms can be customized also in terms of color and background color using the corresponding fields in their options tab.

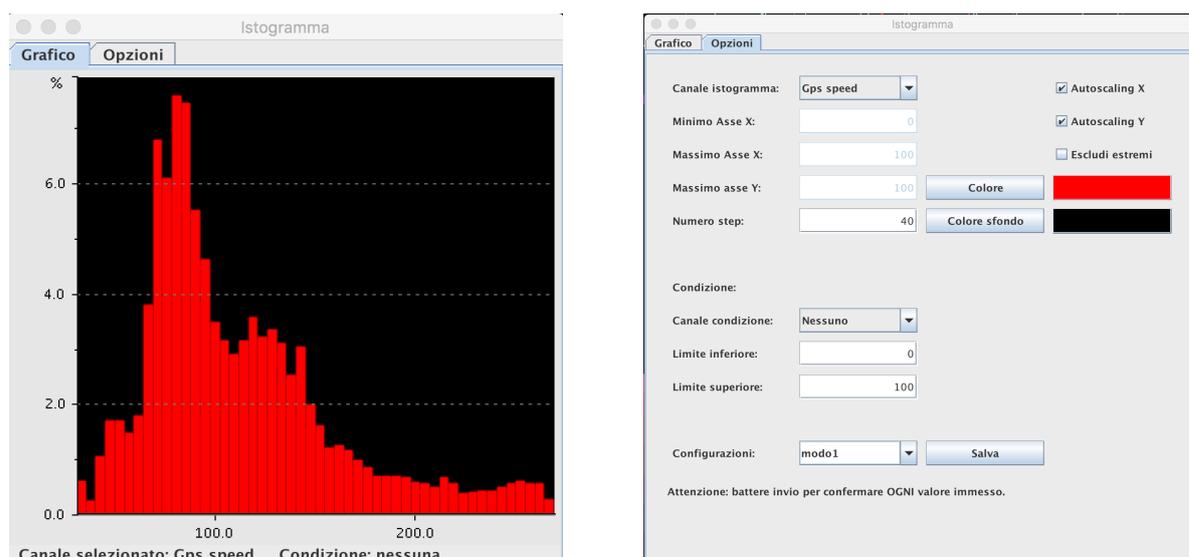


Fig. 41 – Histogram and its options

It is also possible to specify a *condition* that must be verified to make the values of the corresponding channels valid. Finally, the configuration can be saved and renamed.

Close all the histograms allows you to close all the visible histograms. Each histogram can be closed individually by closing its window.

Configured histograms allows you to create a configuration including more than one histogram, as one for the fork and one for the mono, for example, or two histograms for their diving speeds. After creating the histograms, you can save the current configuration and rename it; it will be available to be loaded in the future. ATTENTION: it is necessary to select the configuration on which you want to act BEFORE starting to add or to modify the histograms.

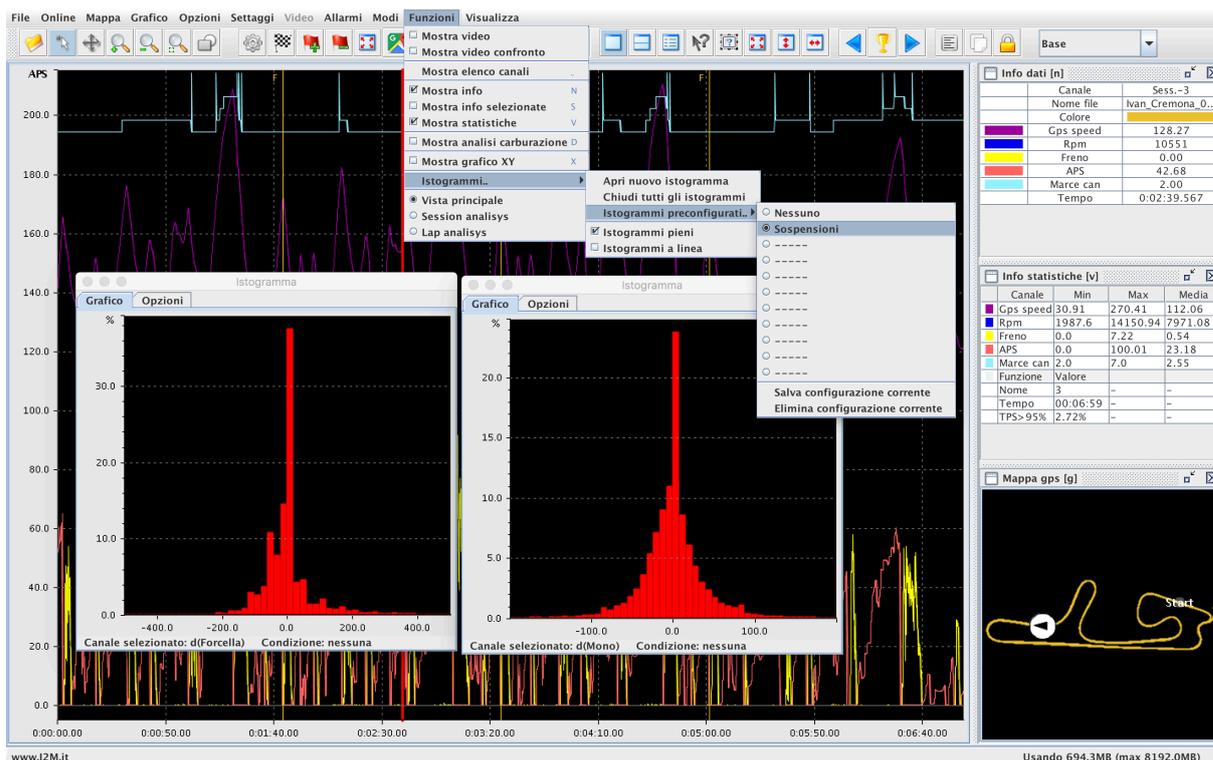


Fig. 42– Istogrammi preconfigurati

Filled histogram allows you to choose if you want to plot histograms featuring the same color for the edge and the body of the bars or if you want to see only the edges of the bars. Showing only the bar edges might be useful if you superimpose histograms of different sessions. *Line histogram* allows you to choose if you want to plot histograms with bars or using a line that connects the maximum values of each computed bar.

- **Session analysis/Lap analysis:** Session analysis all the available sessions are shown. For each session, the minimum, maximum and average values are shown, each one divided into three channel tables of channels that can be found in the “show info” column of the graph options. For each column the minimum and the maximum value of that channel in each session is highlighted in red and green, respectively. Lap analysis provide the same features but as a functions of the laps.

The screenshot displays three data tables for lap analysis. Each table has columns for Laps, Gps speed, Rpm, Freno, APS, and Marce can. The data is organized into three sections: Valori minimi, Valori Massimi, and Valori medi. The software interface includes a menu bar (File, Online, Mappa, Grafico, Opzioni, Settaggi, Video, Allarmi, Modi, Funzioni, Visualizza) and a toolbar with various icons. The status bar at the bottom right indicates 'Usando 633.3MB (max 8192.0MB)'.

• Fig. 43–lap analysis screenshot

THE VIEW MENU

This menu allows you to customize the graphical aspect of Danas, showing or hiding some windows or options.

- **Show map:** it enables the visualization of the map.
- **Show time table:** it enables the visualization of the sessions/laps table. The table appears automatically upon the opening of a new file.
- **Show status bar:** it enables the visualization of the status bar reporting the info on the memory that currently in use and the memory that is available.
- **Show icon bar:** it enables the visualization of the icons bar. The icons bar can also be dragged and dropped in different positions.
- **Hide windows:** this function allows you to hide all the windows; only the graph will be visible. With the same function it is possible to show all the windows again in the same position as they were before. The function does not apply to the windows docked on the right of the main window.
- **Show analysis tab:** this function allows you to make the three tabs on the main window visible, in order to have fast access to the session and the lap analysis. They are typically disabled to maximize the visible portion of the graph.
- **Show map tab:** this function allows you to make the map options tab visible. Map options can be accessed also using the button on the icons bar or from the map menu.
- **Show info in window:** when selected, it allows to see the info window undocked from the graph.
- **Show map in window:** when selected, this option allows you to see the map window undocked from the graph.
- **Show stat. in window:** when selected, this option allows you to see the statistics window undocked from the graph.
- **Show selected info automatically:** when this option is active, moving the cursor while clicking the right button will make a window appear with the info on the selected interval; the window and the second cursor will disappear when any point on the graph is selected (left-click).

- **Full screen:** it enables full screen.