ESCV (client) v1.6.0

for Android™ devices

URL: www.oipaz.net/ESCV.html

eMail: mario@corsolini.net

Contents

1. Introduction

ESCV (client) for Android[1] (pronunciation: ['ɛsku]) allows to acquire the answers given to questionnaires created with ESCV for Windows®[2] v2.4.0 or later, in real time, through the video camera of a smartphone or tablet, evaluating the points obtained.

2. Requirements

Android 8.0 (Oreo, API level 26) or higher.

The app needs a video camera with a resolution of at least 1280×720 pixels (although 1920×1080 pixels would be better) and a processor powerful enough to analyse at least two frames per second.

In order to have bidirectional data exchange, an FTP server[3] needs to be installed on the computer where ESCV for Windows is used. The server should allow access to the folders containing all the data of the tests to be assessed. Otherwise, ESCV for Windows itself (v2.5.0 or later) may act as a one-way server.

3. Installation

Install in a smartphone or tablet the latest distribution of ESCV (client) for Android from Google Play.[4]

4. Instructions for use

The first time ESCV (client) for Android is launched it is necessary to provide the details of the server managing the data of the tests, through the third

[1] Android and Google Play are trademarks of Google LLC.

[2] Windows is a trademark of the Microsoft group of companies.

[3] For instance: FileZilla Server.

[4] The app is also available on `https://www.oipaz.net/ESCV.html` yet, if you download and execute the APK file distributed there, you will need to allow upon request the installation from an "unknown source".

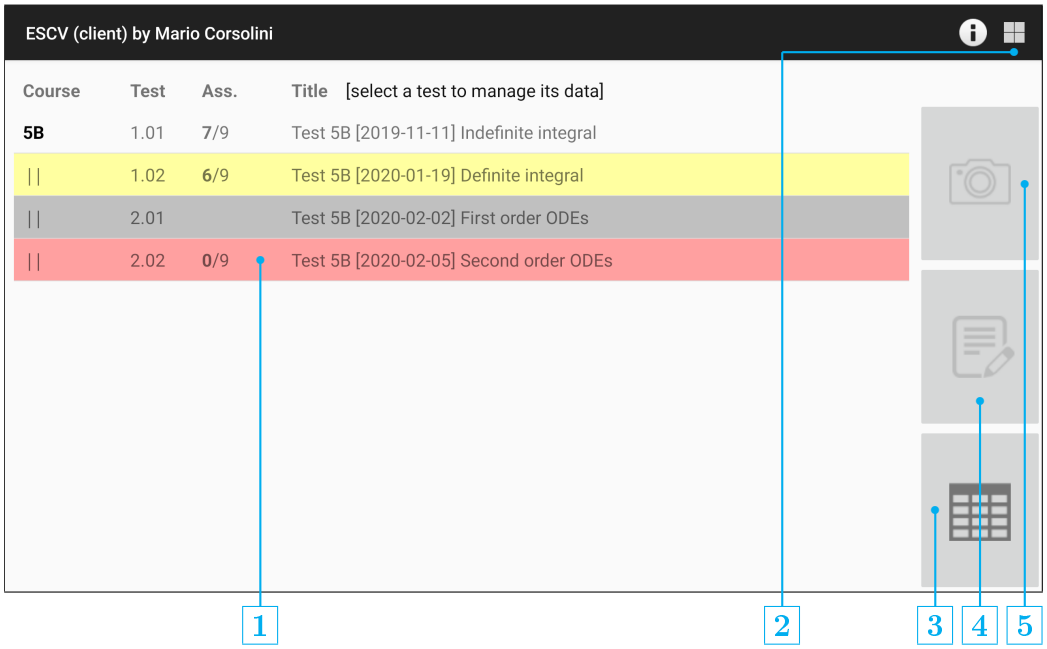


Figure 1: main window.

1 List of the tests available on the Windows computer.

2 ESCV for Windows connection menu.

3 Button to show marks' averages for each course, if available (figure 2 on the facing page).

4 Button to show the details of the selected test. If the image of answers' sheet is available, answers may be edited (figure 5 on page 8), in the same way described in Answers' importation (§ 4.2 on page 6).

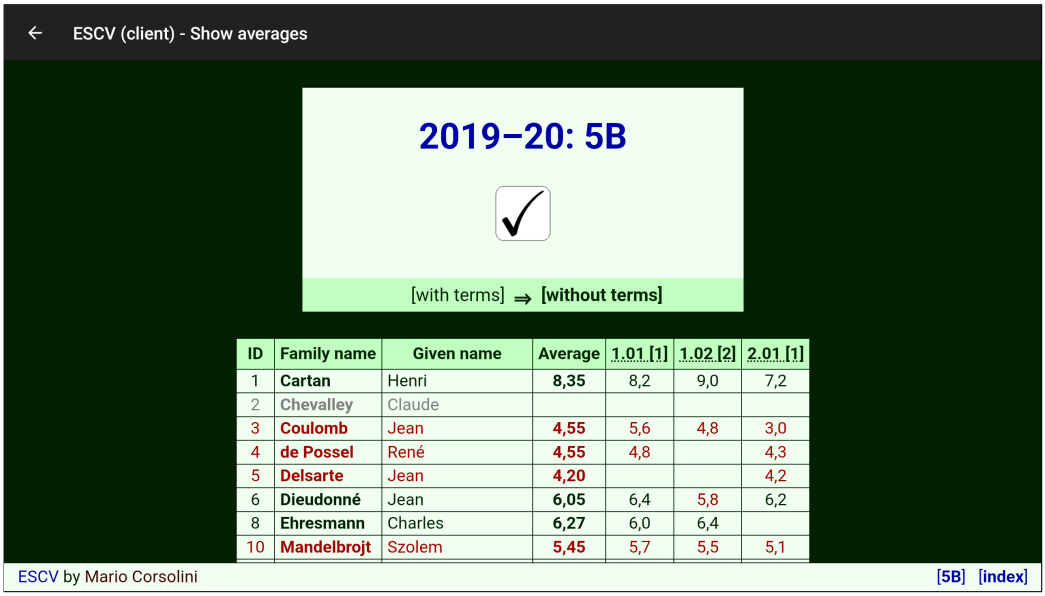
5 Button to start frame analysis (figure 3 on page 6) and data importation (figure 4 on page 7).

item of the server menu[5] in the upper right corner of the display ("Server settings").

Depending on the specific version of Android in use, the app could ask the user to grant permission for a few restricted system resources (video camera and mass storage). If permission is denied the app will not be able to perform its expected functionalities.

4.1 Loading tests' data

After the server connection is accurately set up, the app will automatically load the current data available on the Windows computer.[6] Those data will be displayed in the list 1 as shown in figure 1 on the facing page. If available, the tables of student's marks' averages will be downloaded as well, as shown in figure 2.



ID	Family name	Given name	Average	1.01 [1]	1.02 [2]	2.01 [1]
1	**Cartan**	Henri	**8,35**	8,2	9,0	7,2
2	**Chevalley**	Claude				
3	**Coulomb**	Jean	**4,55**	5,6	4,8	3,0
4	**de Possel**	René	**4,55**	4,8		4,3
5	**Delsarte**	Jean	**4,20**			4,2
6	**Dieudonné**	Jean	**6,05**	6,4	5,8	6,2
8	**Ehresmann**	Charles	**6,27**	6,0	6,4	
10	**Mandelbrojt**	Szolem	**5,45**	5,7	5,5	5,1

Figure 2: medie dei voti.

[5] 2 in figure 1 on the preceding page.

[6] Later it will be possible to use the item "Get data from server" from the server menu, in order to load new tests or to update the status of the preexisting ones.

In the list all the tests already assessed have a white background,[7] the ones created by setting manual assessment have a grey background (and they can not be selected or managed by the app), those with a red background have no assessment so far, those on a yellow background contain new data acquired by the app and not yet sent to the Windows computer.

4.2 Answers' importation

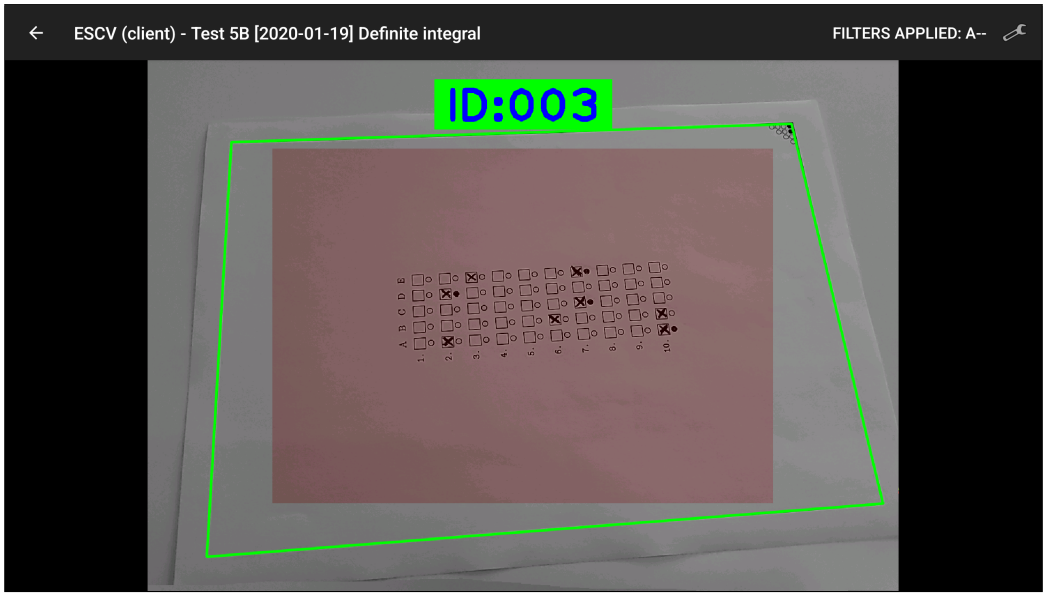


Figure 3: frame analysis. The rectangle containing the answers, initially red, gradually becomes green when the minimum number of consecutive accurately recognised frames is reached.

When the video camera is switched on, aim it toward the answers' sheet you want to import from such a distance to fill almost the whole frame. As shown in figure 3, the rectangle surrounding the answers' table must be entirely kept inside the non-reddish zone of the frame. The sheet must be entirely visible, evenly lit, not bent. If the quality of the images is low, the recognition may be facilitated by applying the filters available in the

[7] The column "Ass." shows the number of assessed questionnaires over the total number of those created for each test.

menu on the upper right corner of the view (autogamma, stretch histogram and contrast adjustment). In the same menu it is also available the item "Minimum stability", which allows to modify the minimum number of consecutive frames recognised as identical required to import the data (a high value guarantees greater reliability but more time will be needed, especially on non-particularly fast devices).

Tapping on the image will toggle between the normal view (in greyscale) and the b/w frames processed to pinpoint the edges of focused objects.

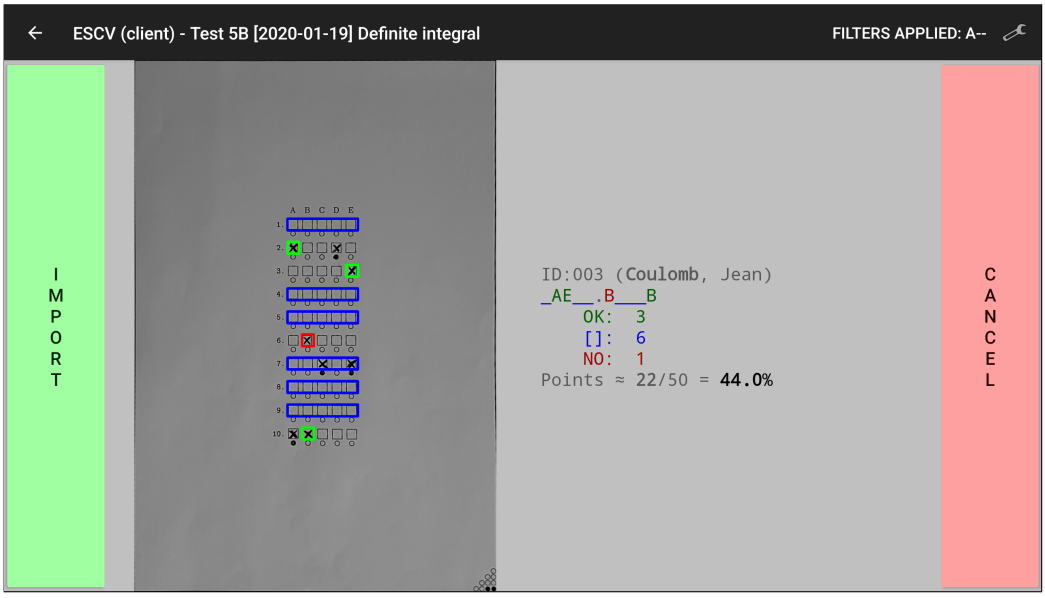


Figure 4: confirmation of recognised answers.

Once the minimum stability is reached, the answers' sheet is shown rectified, as in figure 4, together with additional data regarding the questionnaire: student's name (if available), answers recognised by the app, number of answers respectively right, empty, wrong and total points scored. In case there is a compensation provided by a customised educational plan (as in the example shown in figure 4), the score is estimated on the base of a value which could be slightly different from the one set in the definitive assessment carried out on the Windows computer (notice, in the figure, the use of the symbol "≈" instead of "=").

Right answers have a green frame, wrong answers have a red frame and questions without answers have a blue rectangular frame. It is possible to manually amend wrongly recognised answers by touching the squares on the image (if a framed square is touched the question will be marked as without answers, a touch on the question number on the left of the squares will nullify the question). The image may be enlarged (using two fingers or through a double tap) for a more accurate edit.

When the data are accurate, accept them (and therefore save them in the device) by tapping on the green button, otherwise use the red button to cancel the recognition and restart the procedure.

Further amendments of imported answers may be applied by tapping on the button "View data of the selected test" in the main window.

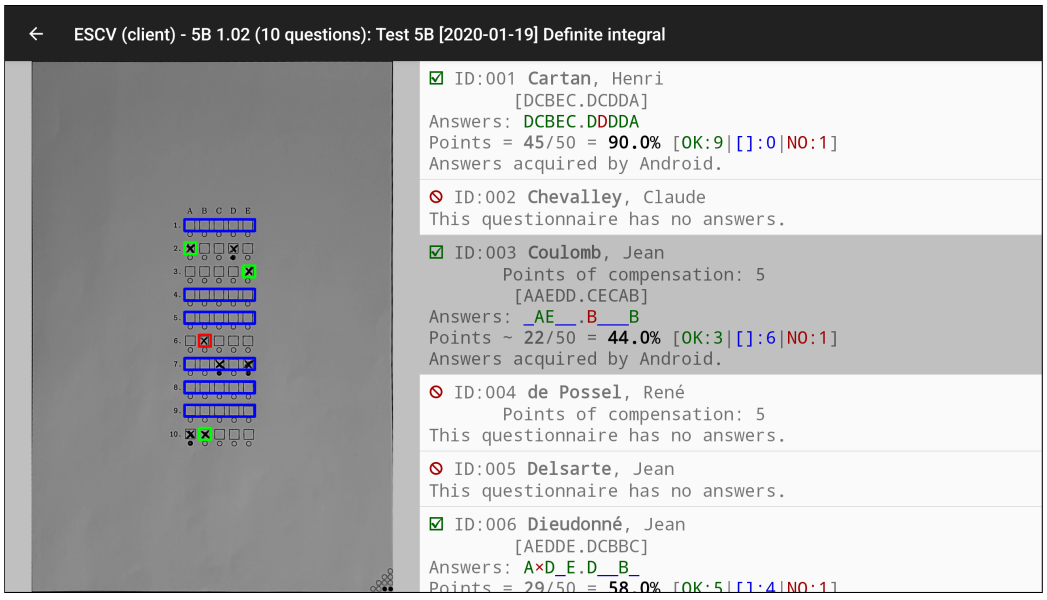


Figure 5: view/edit imported data.

4.3 Sending imported answers

After the app has imported or edited the data of at least one questionnaire, the menu item "Send data to server" of the server menu[8] will become active,

[8] 2 in figure 1 on page 4.

if FTP connection has been set up. By tapping on it, it will be possible to choose the tests whose data imported by the app will be sent via FTP to ESCV for Windows, which may import them and process them further.

In addition to given answers, ESCV (client) for Android also locally saves the frames from which it extracted the aforementioned answers, for sending them to Windows later on. Those frames are saved in a very compressed format and they usually take up less than 200 Kibyte each; they are stored in the folder "ESCV" inside the pictures' folder of the device (or inside "DCIM", on older versions of Android). They will be deleted when new data are received from ESCV for Windows, unless the option "get answer's sheets as well" in the "Server settings" menu is selected.

5. How to uninstall

Apply the ordinary procedure for uninstalling apps established by the version of Android in use and remove, if they have been created, the local copies of the frames imported by the app. That will completely uninstall ESCV (client) for Android. :-(

If you had to install an FTP server on the computer where ESCV for Windows is used, you may remove it through the usual "Add/Remove" applet of the Windows Control Panel.

6. Legal policies

Graphic computations are carried out by the library OpenCV, distributed under the Apache-2.0 licence.

Enlargement of frames is actualised by TouchImageView, distributed under the MIT licence.

FTP data interchange between "ESCV (client) for Android" and "ESCV for Windows" is managed by the library ftp4j, distributed under the LGPL 2.1 licence.

"ESCV (client) for Android" is free of charge, nevertheless "ESCV for Windows" is donationware: if you like it and you wish to contribute to its development, please send a donation to the author through the PayPal account OiPaz@oipaz.net.[9]

6.1 Personal data

"ESCV (client) for Android" does not collect any personal data. Neither analytics nor advertising tools are present in "ESCV (client) for Android".

"ESCV (client) for Android" takes pictures by means of the main video camera of the device where it runs: the user is fully responsible for all information contained within. In most cases, those pictures are contained within the device where "ESCV (client) for Android" runs and not accessible externally. Enabling external access requires manual steps and should be done at the user own risk. The pictures stored by "ESCV (client) for Android" may be deleted by means of any standard file managing tool.

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[9] https://www.paypal.com/cgi-bin/webscr?cmd=_donations&business=95V9M5CZJBYHE&currency_code=EUR&source=url

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7. Feedback, suggestions, bug-reports

Any comments, suggestions and (most of all) bug-reports are welcome. Please use the eMail address `mario@corsolini.net`

While submitting an error it is advisable to report the device used as well as the version of both the app[10] and Android. It is also advisable to attach, if available, the files "TestData.json" and "TestData.Android.json" (from the folder in the Windows computer of the test that raised the error) and/or anything useful to reproduce and analyse the problem.

[10] Check on Google Play whether it is the most updated one. In case it is not, please update the app and check whether the issue is still occurring.

8. Release history

- Version **1.6.0** — June 21st 2025
  - Added: "Connect to ESCV for Windows" in "Server settings" (ex-"FTP settings").
  - Minor cosmetic changes.
- Version **1.5.2** — May 20th 2025
  - Bugfix: all the windows were poorly displayed on Android 16.
  - Removed: menu item "Show averages" (replaced by a button).
  - Minor amendments and cosmetic changes.
- Version **1.5.1** — March 20th 2025
  - Bugfix: dispensation was poorly implemented to scores in the lowest ranges.
  - Minor cosmetic changes.
- Version **1.5.0** — November 11th 2024
  - Added: option "get answer's sheets from server" in "FTP settings".
  - Added: automatic per-app language support (in Android 13 or later).
  - Bugfix: amendments brought in the window of details of data of the tests were not saved.
  - Minor amendments and cosmetic changes.
- Version **1.4.1** — April 10th 2024
  - Minor cosmetic changes.
- Version **1.4.0** — April 1st 2024
  - Added: manual amendment of imported answers in the window of details of data of the tests.
  - Bugfix: automatic removal of imported frames did not remove empty folders.
  - Minor cosmetic changes.
- Version **1.3.1** — February 5th 2024
  - Bugfix: the number of assessed questionnaires displayed in the main window now keeps track of the ones imported with the app.

  - Bugfix: displayed frames could have noisy borders after resuming an interrupted importation of new data.

- Version **1.3.0** — January 5th 2024
  - Added: menu item "Show averages" in the main window.
  - Added: automatic removal of imported frames when overwriting or receiving new data from Windows application.
  - Removed: menu item "Grid frame type" in the window of new data importation.
  - Minor cosmetic changes.

- Version **1.2.0** — February 5th 2023
  - Added: colours for right (green), empty (blue) and wrong (red) answers.
  - Added: list of right answers in the window of details of data of the tests.
  - Improved: identification of the grid.
  - Removed: splash screen.
  - Minor amendments and cosmetic changes.

- Version **1.1.1** — January 21st 2023
  - Bugfix: OpenCV failed to provide frames from the video camera.
  - Bugfix: sometimes changes in some settings were not saved.
  - Bugfix: on some devices FTP transfers were incomplete.
  - Bugfix: completely blank frames were not analysed.
  - Removed: automatic check for updates in the window of information.

- Version **1.1.0** — June 21st 2022
  - Added: manual amendment of the answers in the window of new data importation.
  - Improved: identification of the grid.
  - Removed: internal PDF viewer.
  - Minor cosmetic changes.

- Version **1.0.2** — May 1st 2021
  - Bugfix: compensation was miscalculated for scores in the lowest range.
- Version **1.0.1** — April 1st 2021
  - Bugfix: updated OpenCV to a version working in release build.
- Version **1.0.0** — March 20th 2021
  - First version publicly released.

9. Acknowledgements

Thanks to the authors of OpenCV,[11] TouchImageView[12] and ftp4j[13] for providing their useful libraries.

The author wants to thank all the people who helped him with ideas and valuable suggestions, as well as the beta testers!

And, obviously, thanks to Laura!!

Enjoy!!!

[11] https://opencv.org/

[12] https://github.com/MikeOrtiz/TouchImageView/

[13] https://www.sauronsoftware.it/projects/ftp4j/