

# ESCV (client) v1.4.1

for Android™ devices

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URL: [www.oipaz.net/ESCV.html](http://www.oipaz.net/ESCV.html)

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## 1. Introduction

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

## 2. Requirements

Android 7.0 (Nougat, API level 24) or higher.

An FTP server<sup>3</sup> 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.

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

## 3. Installation

Install in a smartphone or tablet the latest distribution of ESCV for Android from [Google Play](#).<sup>4</sup>

## 4. Instructions for use

The first time ESCV for Android is launched it is necessary to provide, through the first item of the main menu in the upper right corner of the display (“FTP settings”): the address of the FTP server managing the data

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<sup>1</sup> Android and Google Play are trademarks of Google LLC.

<sup>2</sup> Windows is a trademark of the Microsoft group of companies.

<sup>3</sup> For instance: [FileZilla Server](#).

<sup>4</sup> The app is also available on <https://www.oipaz.net/ESCV.html>; if you download and execute the APK file distributed there you will need to allow upon request the installation from an “unknown source”.

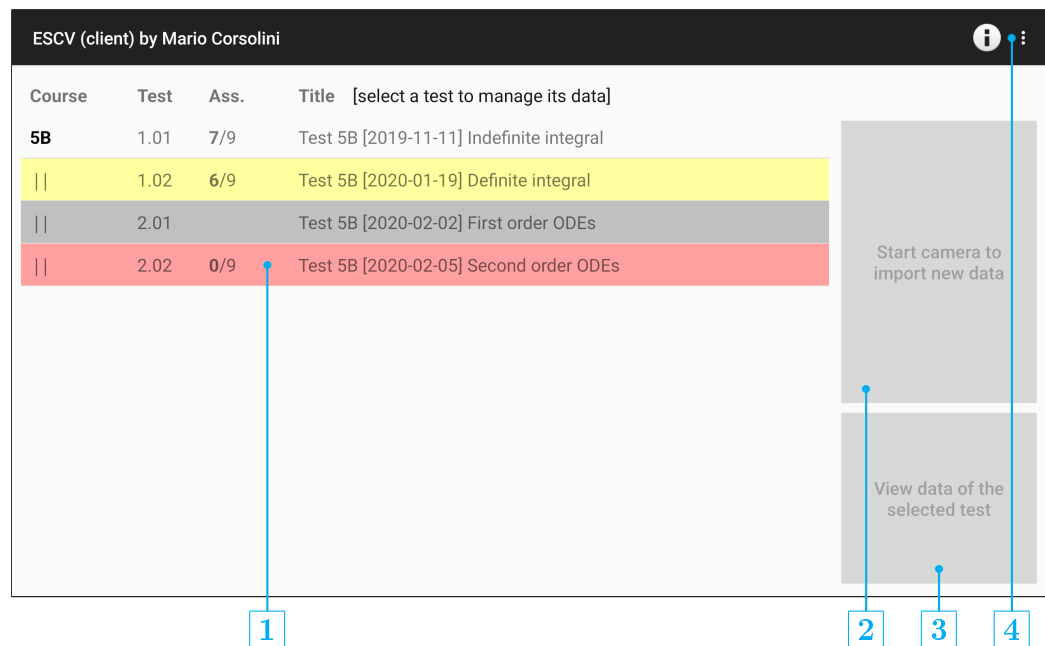


Figure 1: main window.

- 1** List of the tests available on the Windows computer.
- 2** Button to start frame analysis (figure 2 on page 7) and data importation (figure 3 on page 7).
- 3** Button to show the details of the selected test. Questionnaires imported by the app may also be edited (figure 4 on page 8), in the same way described in **Answers' importation** (§ 4.2 on page 5).
- 4** Main menu.

of the tests (it must be installed in the same computer where ESCV for Windows runs), user name and password for logging in and, if needed, the path to the root folder of the courses (relative to the root folder set in the FTP server).

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 FTP connection is accurately set up, the app will automatically load the current data available on the Windows computer.<sup>5</sup> Those data will be displayed in the list [1](#) as shown in figure 1 on page 4.

In the list all the tests already assessed have a white background,<sup>6</sup> 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; finally, if both the last circumstances exist, the background will be orange.

## 4.2 Answers' importation

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 2 on page 7, 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 menu on the upper right corner of the view (autogamma, stretch

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<sup>5</sup> Later it will be possible to use the item "Get data from server" from the main menu, in order to load new tests or to update the status of the preexisting ones.

<sup>6</sup> The column "Ass." shows the number of assessed questionnaires over the total number of those created for each test.

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.

Once the minimum stability is reached, the answers’ sheet is shown rectified, as in figure 3 on page 7, 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 3 on page 7), 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 “ $\approx$ ” 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.

### 4.3 Sending imported answers

After the app has imported the data of at least one questionnaire, the menu item “Send data to server” will become active. By tapping on it, it will be possible to choose the tests whose data imported by the app will be sent via

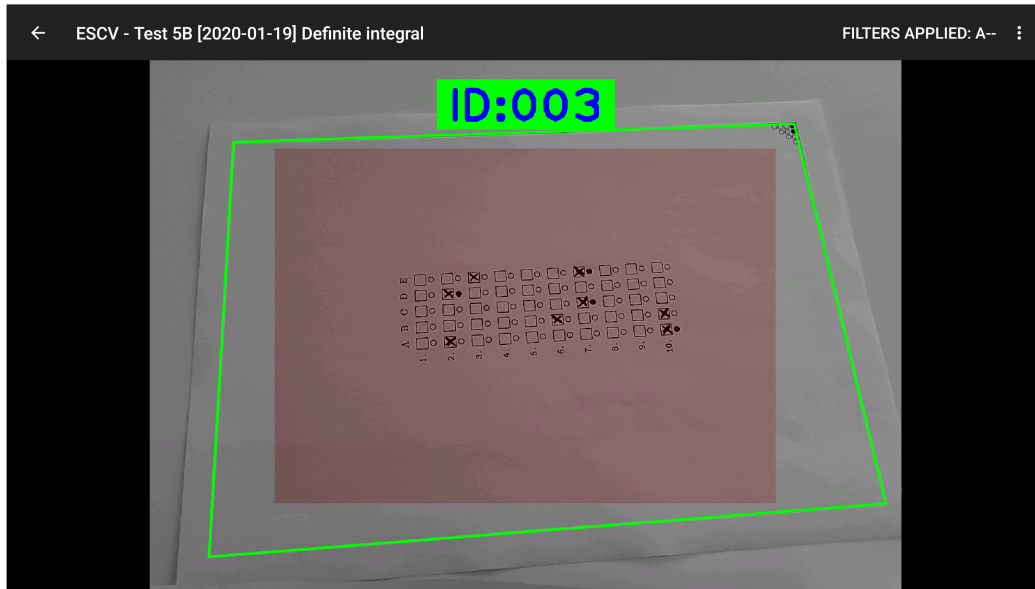


Figure 2: frame analysis. The rectangle containing the answers, initially red, gradually becomes green when the minimum number of consecutive accurately recognised frames is reached.

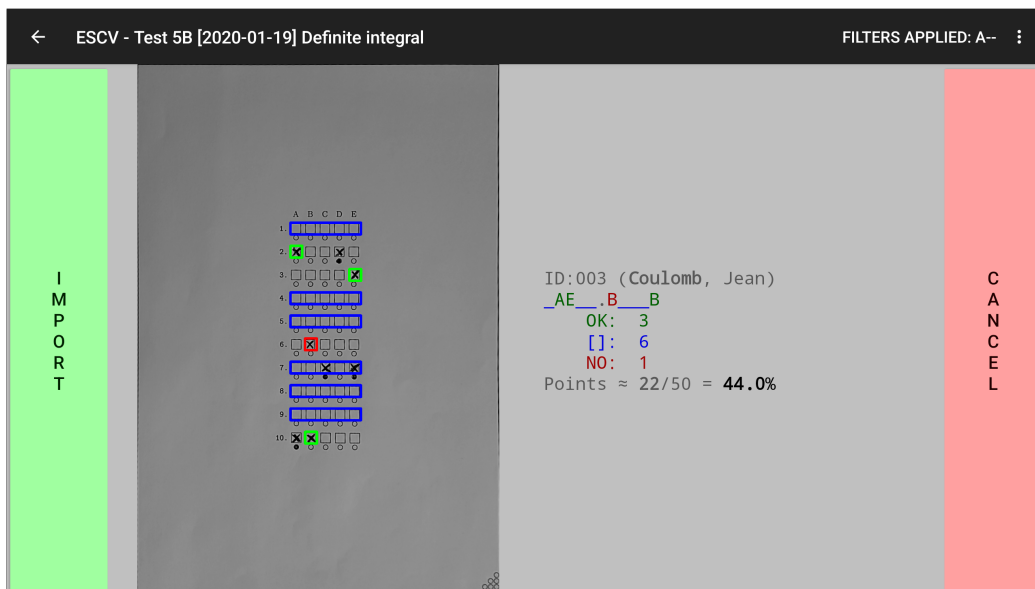


Figure 3: confirmation of recognised answers.

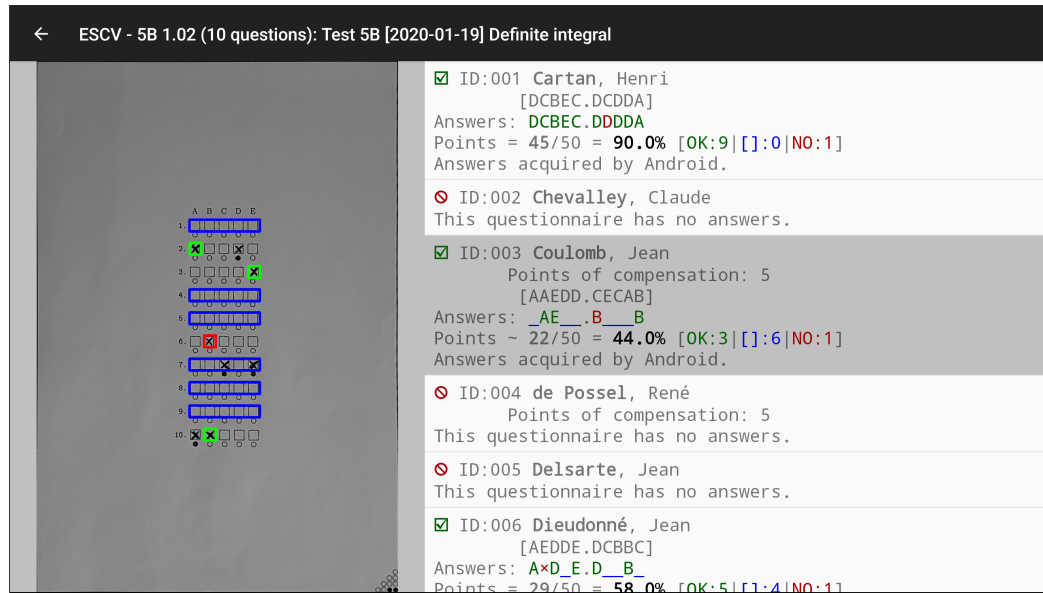


Figure 4: view/edit imported data.

FTP to the Windows application, which may import them and process them further.

In addition to given answers, ESCV 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 the FTP server.

## 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 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.

Data interchange between “ESCV for Android” and “ESCV for Windows” is managed by the library [ftp4j](#), distributed under the [LGPL 2.1](#) licence.

Enlargement of frames is actualised by [TouchImageView](#), distributed under the [MIT](#) licence.

“ESCV 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](mailto:OiPaz@oipaz.net).<sup>7</sup>

### 6.1 Personal data

“ESCV for Android” does not collect any personal data. Neither analytics nor advertising tools are present in “ESCV for Android”.

“ESCV 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 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 for Android” may be deleted by means of any standard file managing tool.

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<sup>7</sup> [https://www.paypal.com/cgi-bin/webscr?cmd=\\_donations&business=95V9M5CZJBYHE&currency\\_code=EUR&source=url](https://www.paypal.com/cgi-bin/webscr?cmd=_donations&business=95V9M5CZJBYHE&currency_code=EUR&source=url)

## **6.2 Disclaimer of warranty and limitation of liability**

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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](mailto:mario@corsolini.net)

While submitting an error it is advisable to report the device used as well as the version of both the app<sup>8</sup> 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.

## 8. Release history

- Version **1.4.1** — April 10<sup>th</sup> 2024
  - Minor cosmetic changes.
- Version **1.4.0** — April 1<sup>st</sup> 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 5<sup>th</sup> 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 5<sup>th</sup> 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.

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<sup>8</sup> 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.

- Removed: menu item “Grid frame type” in the window of new data importation.
  - Minor cosmetic changes.
- Version **1.2.0** — February 5<sup>th</sup> 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 cosmetic changes and fixes.
- Version **1.1.1** — January 21<sup>st</sup> 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 21<sup>st</sup> 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 1<sup>st</sup> 2021
  - Bugfix: compensation was miscalculated for scores in the lowest range.
- Version **1.0.1** — April 1<sup>st</sup> 2021
  - Bugfix: updated OpenCV to a version working in release build.
- Version **1.0.0** — March 20<sup>th</sup> 2021
  - First version publicly released.

## 9. Acknowledgements

Thanks to the authors of OpenCV,<sup>9</sup> ftp4j<sup>10</sup> and TouchImageView<sup>11</sup> 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!!!

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<sup>9</sup> <https://opencv.org/>

<sup>10</sup> <https://www.sauronsoftware.it/projects/ftp4j/>

<sup>11</sup> <https://github.com/MikeOrtiz/TouchImageView/>