

IMPORTANT: ADECCO TEAM CHECKS THE CODING STANDARDS OF YOUR DELIVERED SOFTWARE. IF YOU DO NOT MEET CODING STANDARDS, FURTHER MILESTONES MAY NOT BE ASSIGNED TO YOUR TEAM. YOU TEAM SHOULD NOT COMPROMISE CODING QUALITY OR UI DESIGN QUALITY ANYWAY.

You should develop an offline Windows desktop software with Python **for facial recognition**. So, the software will not be hosted in any server. You will need to provide us source codes and generate 64 Bits and 32 Bits exe files for the software that works on Windows OS in Intel or AMD based processor.

When an user launches the software, it must start in fullscreen mode. But the user will have the option to decrease window size or minimize too. You should use Arial font for the software.

For facial recognition, you must use the Python library Insightface:
<https://github.com/deepinsight/insightface> .

The Windows offline desktop software backend must be created with Python. Because you have to use Insightface {a Python library} in the software and programming languages other than Python may not be compatible with Insightface Python library.

You may need to use Python 3.7 to be compatible with Insightface and its dependencies. Higher versions may not be compatible with Insightface and its dependencies. In our existing facial recognition website, we used Python 3.7.10 with Insightface. So make sure about the right Python version to use with Insightface before you start working.

InsightFace uses machine learning. This is the link to download the Insightface pre trained models bundle for facial recognition, detection, alignment and attributes: <https://drive.google.com/file/d/18wEUfMNohBJ4K3Ly5wpTejPfDzp-8fI8/view?usp=sharing> . The models bundle name is antelopev2. It contains some onnx files. In Insightface repo, you will find antelopev2 bundle in <https://github.com/deepinsight/insightface/tree/master/python-package> page. You should use the antelopev2 bundle for our software. Please note that the default models bundle used by Insightface is buffalo_l. But, as per our previous experiments, antelopev2 pre trained models bundle is more accurate than buffalo_l pre trained models bundle. That's why you must use antelopev2 models bundle instead of the default buffalo_l models bundle.

The software should show matched photos with a minimum facial recognition similarity score of 70%. If $70\% \leq \text{"similarity score"} < 80\%$, the match result will be classified as "Low match". If $80\% \leq \text{"similarity score"} < 90\%$, the match

result will be classified as “High match”. If $90\% \leq \text{“similarity score”} \leq 100\%$, the match result will be classified as “Highest match”. So there will be 3 similarity thresholds used in the software, one is 70% for “Low match”, another is 80% for “High match” and another is 90% for “Highest match”.

After creating the facial recognition system, if you want to test its accuracy, you can test it with this “Labeled Faces in the Wild” dataset {5749 ids/13233 images/6K pairs}: <http://vis-www.cs.umass.edu/lfw/#download>

Insightface is supposed to be 99.86% accurate on the LFW dataset.

You can download any other dataset to test the facial recognition accuracy of the software, if you want to do so. But we assure you that Insightface pre trained models are very accurate, so you can rely on it. Because of this, we recommend you to conduct facial recognition accuracy testing after you complete creating the entire software.

Upon software installation, when the user runs the software, the software should detect GPU and use GPU for facial recognition process if available. And if GPU is not available, it will use CPU for the facial recognition process.

This is to inform you that we already have a website that is recognizing faces using Insightface and cosine similarity mathematical formula. So, if you are not sure about the correct way to use Insightface in the offline desktop software, just let us know, we will give you access into the Github repo of our facial recognition website so that you can review its codes to get an idea about required programming for facial recognition.

Now let me describe the software functionalities. When an user clicks the exe file, installation should start. The software will ask the user to select paths for “FaceAI program” folder and “FaceAI data storage” folder separately during installation. “FaceAI program” folder path will be auto generated by default under Windows drive {user will be able to enter a different path there than the default path though}, but “FaceAI data storage” folder path will not be auto generated, the user will be asked to input it manually. It’s mandatory for the user to mention both folder paths. The software will be installed under “FaceAI program” folder. But the software data will be stored under “FaceAI data storage” folder.

You can not send us ZIP bundle for the software. You have to send us single exe file that contains everything. Furthermore, the exe file needs to be installable. Once installed, the software icon should appear in the user’s desktop page as desktop shortcut and should also be listed under Start menu. Don’t send us such exe that needs to be executed every time the user wants to launch the software.

When the desktop shortcut for the software is clicked, the software needs to be launched quickly. If the software takes some time to load, users will not want to use it.

Software license key and lock features: There will be an option to enter license

key and validity duration of the key in the source codes/DB {that is better effective} before exe generation. The FaceAI software company will not hand over the exe file to a customer directly. A sales agent of the FaceAI software company will have a USB drive {pen drive} containing the exe in it. The sales agent will insert the USB drive in customer's PC and install the software in customer's PC using the exe directly from the USB drive, without copy pasting the exe into the customer's PC. By default, the software will be installed under Windows drive in "FaceAI program" folder, where the "FaceAI data storage" folder is located in a different path preferably. Once the installation is completed, the sales agent will remove the exe from the customer's PC without providing the customer a copy of the exe.

In the source codes/DB, we need to enter license key validity duration in years or months. But we need the option to enter license key for other validity duration scales such as days as well, in order to test the software lock feature. We will generate exe with license key validity duration of one day to see if the software gets auto locked in a day after initial activation by license key.

Furthermore, there will be an option in the source codes to enter time zone. License key expiration date will be calculated as per that time zone. Use utc+1:00 for now. There will be no daylight savings time {isdst value false}. And we will be able to edit this time zone value from source anytime.

During installation, DB, "FaceAI Media" folder, "FaceAI Probe reports" folder and "models" folder {where recognition, detection models are stored} must be installed as encrypted, so that users can't tamper those folders and DB themselves. Single encryption/decryption key will be hardcoded in the source codes. Only the software company will know the encryption/decryption key. Use AES 256 Bits encryption algorithm which is the strongest and uncrackable. The "models" folder will be located somewhere inside "FaceAI program" folder.

We need codes protection for the software so that no one can decompile the exe to obtain source codes or to obtain decryption key or to illegally unlock the software without purchasing the license key.

Please ensure that users will not be able to access or edit DB, "FaceAI Media" folder, "FaceAI Probe reports" folder or "models" folder without the decryption key. The onnx files need to be encrypted inside the exe file too so that no one can obtain the onnx files by simply decompiling the exe.

After installing the software from exe, the first time the user runs the software, it will start as a locked software. But what triggers the lock? In database, there will be an entry "Locked". If it's Yes, the software gets locked, if it's No, software is unlocked. When the user launches a locked software, the software will start with "Locked" value "Yes". A locked software means, it will ask for license key before the user can access the interface. As a result, once the user launches a locked software,

it will ask for license key.

So, after launching the locked software, once the user enters the license key, the software will first match the entered license key against the list of license keys in its file. If the entered license key does not exist in the list of keys in file, the software will return an error, "This license key is invalid".

If the entered license key matches any of the keys in file, then it will be accepted. At the same time, the matched key will be removed from the list of keys in file so that the same key can't be used again to unlock the software.

So, after the user launches a locked software, if the user enters a valid license key, the "Locked" value in DB will immediately be changed from "Yes" to "No", or in other words, the software will be unlocked. At the same time, license validity duration will also be written in the DB {e.g. one year, one day etc.}. At the same time, the processor batch number (FPO) and the full serial number (ATPO) will be saved in the DB for hardware lock protection for the software. The processor batch number (FPO) and the full serial number (ATPO) can be fetched with the command powershell get-wmiobject win32_baseboard .

Now the software will be running as an unlocked software. But before the user can access the interface in an unlocked software, the software needs to connect to internet for a security check described below.

The unlocked software now connects to ntp {Network Time Protocol} server. The reason the software will connect to ntp server is that the software will not use the PC time. So, the software will have it's own clock that can count date and time itself {without taking PC time into consideration} even when the software is not connected to internet. But, since the software doesn't have a battery that will keep the clock running all the time in the background, it's usual for the software clock to forget the date and time when the software is closed and re launched. For this reason, once the software is closed and re launched, the software will connect to ntp server to synchronize software clock with ntp server before the user can use the software. During clock synchronization with ntp server, the software will use the time zone hardcoded in software source.

Because of this, as soon as the software is unlocked with a license key, the unlocked software will connect to ntp server to fetch current date and time. Then the software will check the DB if "License expiration date" is mentioned or not. If "License expiration date" is not mentioned, it will calculate the "License expiration date" based on the license validity duration saved in DB.

Let us give you some examples of "License expiration date" calculation. If the validity duration is 1 year and activation date is 1 Apr 2022, the "License expiration

date” will be 1 Apr 2023 and the user will be able to use the software with current license key till 31st Mar of 2023 before 12:00 AM of that night.

If the validity duration is 1 month and activation date is 1 Apr 2022, the expected expiration date will be 1 May 2022 and the user will be able to use the software with current license key till 30th Apr of 2022 before 12:00 AM of that night.

If the validity duration is 1 day and activation date is 1 Apr 2022, the expected expiration date will be 2 Apr 2022 and the user will be able to use the software with current license key till 1 Apr of 2022 before 12:00 AM of that night.

Once the “License expiration date” is calculated, it will be saved in the DB replacing the existing “License validity duration” line. Date format for “License expiration date” will be dd/mm/yyyy.

On the other hand, when an unlocked software is run, after fetching current date and time from ntp server, if the software finds existing “License expiration date” in DB, it will check if the license is still valid or already expired. If the license is still valid, the software will check if the processor batch number (FPO) and the full serial number (ATPO) saved in the DB matches actual FPO and ATPO of the processor respectively and if it matches, the software will let the user access the interface. But if the FPO and ATPO does not match, it will show an error, “You have copied the software into a different computer than the authorized one which is not allowed.” and at the same time the “Locked” value in DB will immediately be changed from “No” to “Yes”, or in other words, the software will be locked, requiring the user to enter license key, and also the “License expiration date” line will be removed from DB.

On the other hand, if the license is found to be already expired, the “Locked” value in DB will immediately be changed from “No” to “Yes”, or in other words, the software will be locked, requiring the user to enter license key, and at the same time, “License expiration date” line will be removed from DB.

If there’s no internet connection when the software tries to connect to ntp server, it will show an error, “Please connect to internet in order to start the software”. It means the user will need an internet connection to access the interface, but once the user has access to interface he/she does not need internet connection to use the software until he/she closes the software and re launches it.

You will show the current date and time on the upper right corner of every page of the software in this format “Date and Time: dd/mm/yyyy hh:mm:ss” which will not be dependent of PC time and which will not require internet connection to work after the initial synchronization with ntp server during launch.

You will also show “License valid till:” on the upper right corner of every page of the software in this format “License valid till: dd/mm/yyyy hh:mm:ss” just below current

date and time. "License valid till:" is slightly lower value than "License expiration date" as we described above.

Please note that, the software will use software clock time {not PC time} for facial recognition report generation {the report contains date and time}, but the software will not need internet connection for facial recognition report generation as the software clock does not need internet connection to operate.

While the user is using the software in interface, if the software clocks reaches the "License expiration date" {which is saved in DB}, the software will change the "Lock" value in DB from "No" to "Yes" {software gets locked asking for license key before the user can use the software again} and "License expiration date" line will also be deleted from DB.

When the user launches an unlocked software, it will synchronize date and time with ntp server, check if the license key is still valid or expired, check if the FPO and ATPO numbers of the processor matches the record before the user can access the interface.

In case, the user runs a locked software, it will first ask for license key to unlock the software and if the user unlocks the software with a valid new license key the software will fetch the FPO and ATPO numbers of the processor and will save those in DB {if there are existing FPO and ATPO numbers in DB, those values will be replaced by new values if new FPO or ATPO numbers are found}, the software will run as an unlocked software as usual. And as described earlier, the next steps for the software will be synchronizing date and time with ntp server, checking if the license key is still valid or expired and checking if the FPO and ATPO numbers of the processor matches the record before the user can access the interface.

The software is used to match a subject face against one or more target faces. **There will be some text data attached to each of the subject photo. The subject photos and the associated text data will remain saved in the "FaceAI data storage" folder in user's PC. Inside the "FaceAI data storage" folder, there will be a DB for the text data and there will be "FaceAI Media" folder for subject photos. The DB file name will also be "FaceAI".**

You may use something like SQLite as DB. But you should not use something like JSON as DB. You must make sure that when an user launches the software, if no DB is detected, the user will get error like "Database is missing. Please insert database." And the user will not be able to access the interface at all. Because, without database, the

program does not know if the software is a locked software or unlocked software. Similarly, if DB is deleted while the user is using the interface, the software will give error like “Database is missing. Please insert database.” And the software will not allow the user to use the interface in that case.

Each page of the software will have logo. Software name is FaceAI. We are giving you a logo auto generated by AI software.



Due to programming workload, if you don't have enough time to create a better logo, you may use this one. You can export the logo from the docx. You can resize the logo to appropriate size for the software. You can generate favicon and icon for the software with the logo file. The icon must be used for the exe file. Icon should also be used for the desktop shortcut and as taskbar icon. The icon should also appear as favicon on the upper left corner of the software window. Next to the favicon, software name “FaceAI” should also appear.

If you have available time and expertise to create a better logo than the above one, you can try that too. And then generate icon, favicon from the logo.

At the bottom of every page {except Home page and 4th page}, there will be “Return to Home” button.

Functionality of each page of the software is described below. Each of the page needs to be full window size page. You have to place each field and button in the right area. You have to pick good style and color. Great UI design is a must for the software to be accepted by users.

Home page of the software

[Logo]

Create a new case

So the Home page will have this single “Create a new case” button only. If the user clicks on this button, 2nd page will open. On the Home page, there will be a “Probe Reports” button too. If the user clicks on “Probe reports” button, he will land on “Probe reports” page.

2nd page

[Logo]

Case number:

PS:

Examiner's name:

Examiner's no.:

Remarks:



Select photo

Subject

photo:

Continue to probe

Return to Home

All the above fields will be mandatory fields. If the user tries to proceed with any of the fields blank, he will get error. For example, if the user leaves "Case number" blank and click on "Continue to probe", he will get error, "Please enter case number".

All of the above fields {except subject photo} will only accept 95 printable basic Latin Unicode characters {Unicode U+0020 to U+007E}: https://en.wikipedia.org/wiki/List_of_Unicode_characters#Basic_Latin . If the user tries to type/paste any other unsupported character in those fields, those unsupported character will not appear in those fields as the system doesn't accept those. Since numbers can be alphanumeric, numeric restrictions are not required in number fields. Any of the 95 supported characters will be accepted.

Maximum number of allowed characters for a field is mentioned below

Case number: 14 characters

PS: 31 characters

Examiner's name: 63 characters

Examiner's no.: 20 characters

Remarks: 139 characters

Once the user reaches character limit in a field, he/she will not be able to type/paste anymore character in that field.

If the user selects a photo in the "Subject photo" field, the photo will be displayed there inside a fixed photo frame. The photo frame will be square shaped. Create a photo frame as big as possible within the fullscreen software window. When the selected photo is displayed inside the photo frame, the aspect ratio (width:height) must be preserved. So, unless the aspect ratio of the photo is 1:1, both the height and width of photo should not fit in the square photo frame. In that case, either height or width {whichever is greater} of the photo will fit in the frame, while some space should remain blank in the other dimension inside the frame.

The user will be able to select valid {not corrupt} raster image files.

There are many raster image file extensions. The question is that what raster image file extensions will the software support? In order to get the answer, you will have to look at Insightface repo and check how many raster image file extensions does it support? We know Insightface works with many raster image file extensions. We don't however know about the exact raster image files extensions that Insightface supports. If you can find this info out, you can allow those specific supported raster image formats in the software. But, if you can't find this info out, then you can allow all the raster image extensions for which your Python program can view the selected image inside an image frame in the UI. Raster image extensions such as GIF those represent dynamic images should not be supported, because Insightface can't process those image extensions {as per our experiment}.

Below the photo frame, you should mention text like, "Raster image files are accepted".

Images higher than 6 MB in size must be resized to maximum of 6 MB size image before processing, maintaining the aspect ratio.

The upload window will not show any other files to choose from except supported formats. If the user tries to upload a corrupt supported image file, he will get error, "The image is corrupt". User will be able to select only a single photo with this option.

The "Remarks" field should contain a slightly bigger box that can contain up to 139 characters.

After the user clicks on "Continue to probe" button, he/she will land on the 3rd page.

Please note that the case details and subject photo should not immediately be saved to DB and "FaceAI Media" folder respectively when

the user clicks on “Continue to probe”. Initially these data should be saved in “Temporary Data” folder inside “FaceAI Storage” folder. Temporary files must be auto deleted after software closure and re launch. These data should be saved to DB and “FaceAI Media” folder only after the “Probe report” is generated in 6th page.

3rd page

[Logo]

Select target photo(s)

* Single photo *Multiple photos * Entire folder of photos * Old case photos

Back
Return to Home

Start probe

The “Back” button will redirect the user to previous page and “Return to Home” will redirect him/her to Home page. The * sign means radio button here. So the user needs to select one of the four radio buttons and then click on “Start probe” link. Single photo button will be selected by default.

If “Single photo” radio button is selected, a “Select target photo” field will appear. If the user selects any photo there, the photo will be displayed there inside a fixed square photo frame.

Create a photo frame as big as possible within the fullscreen software window. When the selected photo is displayed inside the photo frame, the aspect ratio (width:height) must be preserved. So, unless the aspect ratio of the photo is 1:1, both the height and width of photo should not fit in the square photo frame. In that case, either height or width {whichever is greater} of the photo will fit in the frame, while some space should remain blank in the other dimension inside the frame.

The user will be able to select valid {not corrupt} supported image files. So, below the photo frame, you should mention text like, “Raster image files are accepted”. The upload window will not show any other files to choose from except supported image files. If the user tries to upload a supported image file larger than 6 MB, the image must be resized to maximum of 6 MB size image before processing, maintaining the aspect ratio. If the user tries to upload a corrupt supported image file, he will get error, “The image is corrupt”. User will be able to select only a single photo with this option. If the user clicks on “Start probe” button after selecting a single target photo, the subject photo will be matched against that single target photo.

If the user selects “Multiple photos” radio button, “Select target photos” upload box will appear. Below the upload box, mention text like, “Raster image files are accepted”. With this upload box, the user will be able to access a folder and select multiple photos. When the user accesses a folder with this option, he will see checkboxes on all photos so that he can select multiple photos by checking the checkboxes. Only supported image files will appear in the upload window. If the user clicks on “Start probe” button after selecting multiple target photos, the subject photo will be matched against those selected target photos. But if one or some selected photos are corrupt, those photos should not be processed. Among the selected photos, if the software finds at least one photo that meets the requirements, no error will be shown and the software will proceed to next page with the target photos those meet the requirements. But, if among all the selected photos, there is no photo that meets the requirements, the software will show error, “No valid image file is selected.”.

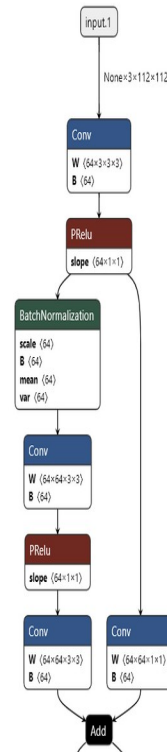
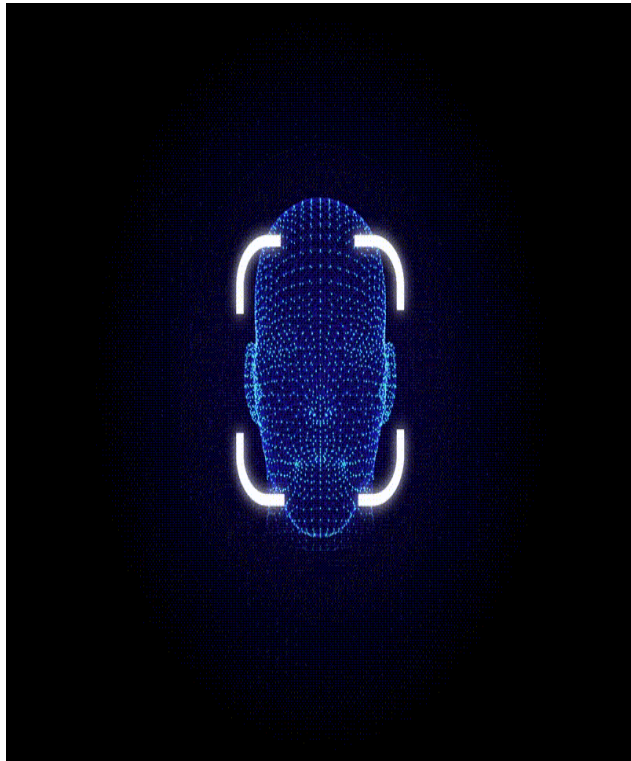
If the user selects “Entire folder of photos” radio button, “Select target folder” upload box will appear there. Below the upload box, mention the text, “Raster image files are accepted”. With the upload box, the user will be able to select a photo folder there {after selecting, folder path will be displayed there} and click on “Start probe”. In this case, the subject photo will be matched against all the target photos in that folder and subfolders. But if one or some files in the target folder and subfolders are not supported image files or corrupt, those files should not be processed. If in the selected folder and subfolders, the software finds at least one photo that meets the requirements, no error will be shown and the software will proceed to next page with the target photos those meet the requirements. But, if in the selected folder and subfolders, there is no photo that meets the requirements, the software will show error, “No valid image file is selected.”. Images higher than 6 MB in size must be resized to maximum of 6 MB size image before processing, maintaining the aspect ratio.

If the user checks either of “Single photo”, “Multiple photos” or “Entire folder of photos” radio button, but does not select any photo or folder path and then click on “Start probe”, he/she will get error, “Please select target photo.”

If the user checks “Old case photos” radio button and clicks on “Start probe”, the subject photo will be matched against all the old case subject photos saved in the “FaceAI Media” folder. Here, the old case subject photos saved in the “FaceAI Media” folder are considered target photos. But in case, there’s no old case photo is available in “FaceAI Media” folder {no facial recognition generated with the software earlier}, the user will get error, “No old case photo is available”, if he/she checks the “Old case photos” radio button and clicks on “Start probe”.

After this, the user will land on 4th page.

This page will show dynamic image of facial recognition along with technical diagram. An example design is shown below.



You can export this 3D face gif from this docx and use it in the software. Duration of this gif is 2s.

Next to this gif, you should show a technical diagram of Insightface containing technical terms and technical data which must be hard for normal users to understand. But the diagram should not mention the word “Insightface” and should not mention model name or dataset name which was used for training.

The above diagram is not correct technical diagram for Insightface I suppose. So, you need to use correct technical diagram for Insightface instead of the above one. The reason we display such technical terms and data in this page is that we want to present this software as big software to the users which will increase the commercial value of the software. It will be better if you can show a dynamic technical diagram with a gif.

Even if the actual facial recognition process takes much less time to be completed, the 4th page will appear for at least 2 seconds before the 5th page loads. In case, the facial recognition process takes more than 2 seconds, then 4th page will remain there until the completion of facial recognition process, after which the 5th page will load. **You must ensure that facial recognition process will be completed very quickly so that the user can access 5th page quickly. If the software takes a long time to load 5th page, users will not want to use the software.**

[Logo]

FaceAI Probe Report Preview

This page will only show a preview of the facial recognition report. Final report is yet to be generated. The layout of this preview page is shown below-

Probe ID: {This line will show an auto generated random unique 9 digits numeric probe ID, which must . not match any other probe ID previously saved in DB.}

Probe result: Matched/Not matched

[Probe result line will be big and bold. Either “Matched” or “Not matched” will be shown there depending on result. If at least 1 photo is matched with a minimum similarity score of 70%, this line will show “Matched”, otherwise it will show “Unmatched”.]

Time of report generation: dd/mm/yyyy hh:mm AM/PM {As per software clock time and not PC time.}

Subject photo: {Here the subject photo will appear inside fixed square frame, maintaining aspect ratio. Photo frame will be big enough in size.}

Case number:

Examiner's name:

Examiner's no.: {These text will appear in multiple lines if a text is too long for single line}

Remarks:

The subject photo hasn't matched to any target photo. {This line will be shown here if at least 1 match not found with a minimum of 70% similarity}

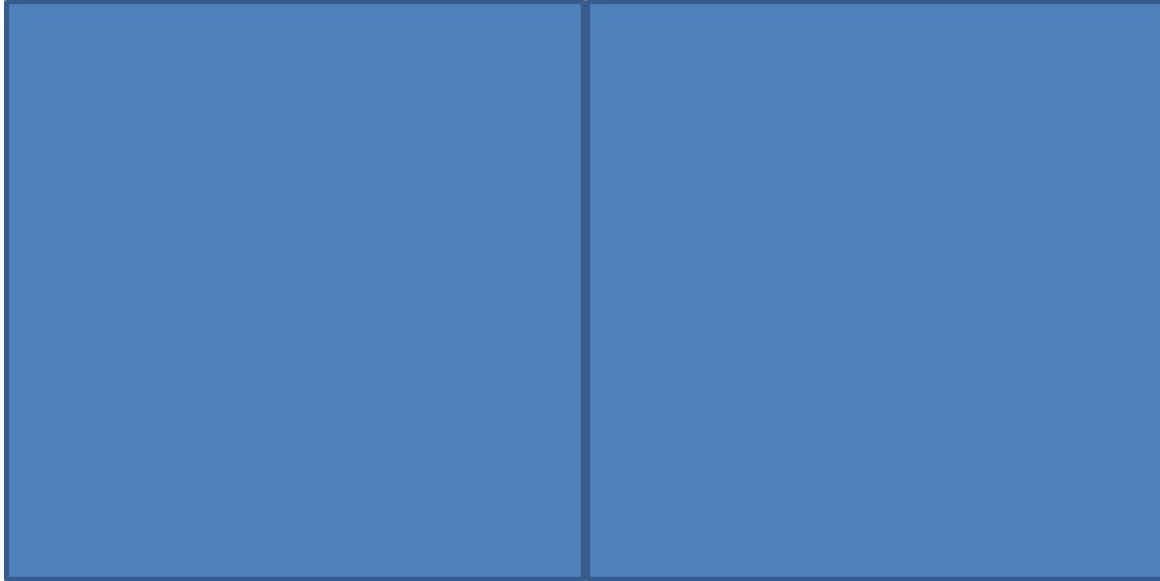
Or

The subject photo has matched to the following target photos. Respective facial recognition similarity scores are attached herewith. {This line will be shown here if 1 or more match found with 70% or more similarity}

The above line will be bold with bigger fonts. If no match found, no target photo will be shown below. If match found, matching target photos will be shown below inside a rectangular “Matched photos box” on the page. The “Matched photos box” will have vertical scrollbar, as the number of matching photos inside the box can be many.

Keep

first ____ matched photos “Go”

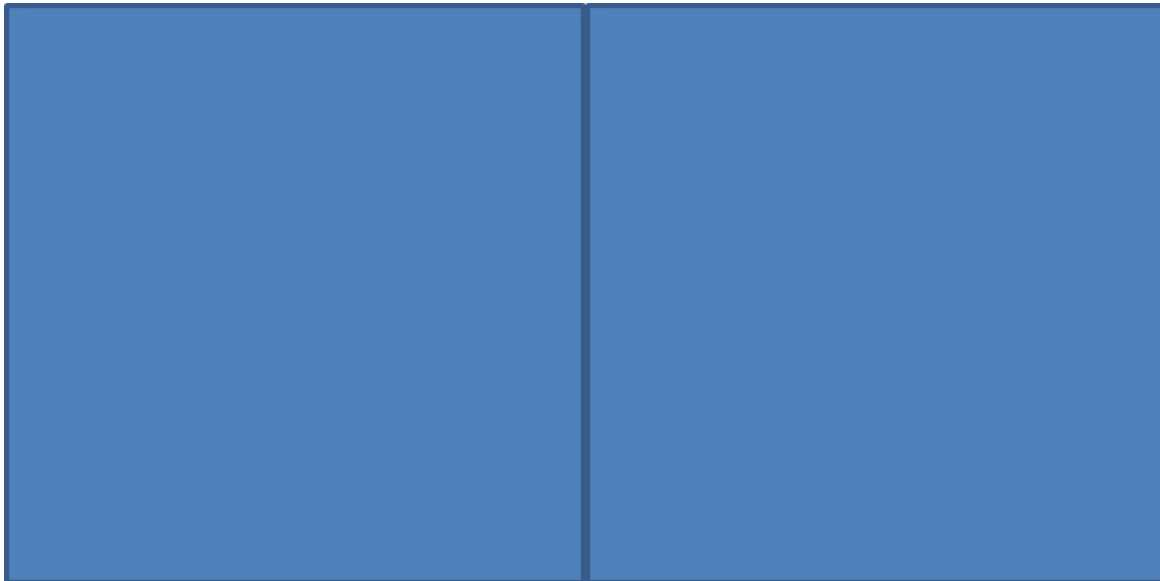


Similarity score: 94.73% (Highest match)
87.82% (High match)

Case no.:
PS:

Similarity score:

Case no.:
PS:



Similarity score: 78.47% (Low match)
(Low match)

Case no.:
PS:

Similarity score: 77.47%

Case no.:
PS:

All the matching photos, no matter how many, will appear inside the above scrollable box one after one. In the list, the best matched photos will appear first {Sort by: Similarity score/descending}, and user will not be given the option to

change the order.

Similarity scores will appear like this: 85.27%, showing two digits after decimal point.

70% ≤ "similarity score" < 80% means "Low match", 80% ≤ "similarity score" < 90% means "High match" and 90% ≤ "similarity score" ≤ 100% means "Highest match". So there will be 3 similarity thresholds used in the software, one is 70% for "Low match", another is 80% for "High match" and another is 90% for "Highest match".

The matched faces in the target photos as well as the face of subject photo will be marked inside red rectangle.

Here we have another note for you. If a target photo doesn't contain a face or contains a face that has too low pixels to be detected or contains a face that is looking far away from the camera {very high angle} that photo may not work with Insightface and may not be shown as "Matched" in the "FaceAI Probe Report Preview" page. Because Insightface can't detect such faces. In such a case, the user will not get any error however. But the photo will simple not be shown as "Matched". We are not sure what's the minimum height and width of a face {in pixels} for detection required by Insightface. If you can find it, let us know. We are also not sure what's the maximum allowed face angle for detection by Insightface {for both the pitch (head tilt towards the front or back) and the yaw (head rotation to the left or to the right); the roll (head tilt to the left or to the right)}. If you can find the info, let us know.

Similarly, if a subject photo doesn't contain a face or contains a face that has too low pixels to be detected or contains a face that is looking far away from the camera {very high angle}, the "FaceAI Probe Report Preview" page will say, "The subject photo hasn't matched against any target photo."

So, whether the user uploads an undetectable face as "Subject photo" or "Target photo", the user will not get any error. That photo will however not be shown as "Matched" in "FaceAI Probe Report Preview" page.

Inside the scrollable box, matched target photos maintain row and column. The matched target photos appear inside square shaped photo frames. But the photos should maintain aspect ratio. It means, unless the height and width of the photo is equal, some space in one dimension of the frame should remain blank. But the other dimension (either width or height which is greater) will fit in the frame.

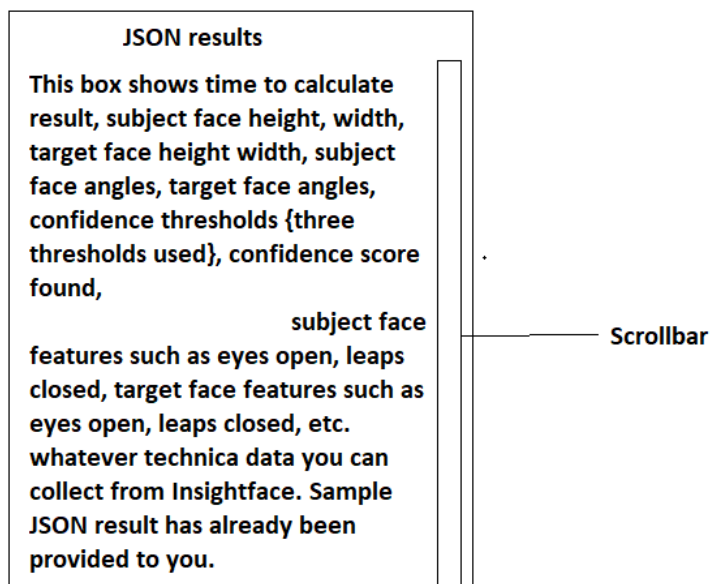
Case no. and PS will not appear below the matched target photos in case a single target photo, multiple target photos or a folder of target photo is used for the probe. In that case, those two lines should remain blank and the matched photos row, column layout will remain same.

In this preview page, each matched target photo will have a cross button attached to it on the upper right corner of the photo. If the user clicks on such a cross button, that specific photo will be removed from the list. The similarity score, "Highest match/High match/Low match" text and case details associated with the matched target photo {if available (only in case of old case photo)} will also be removed

from the page if a matched target photo is manually removed by the user. When a matched target photo is manually removed by the user from this preview page, all the next matched target photos in the list and case details associated with those matched target photos {if available (only in case of old case photo)} will be rearranged in order to fill in the gap created by the deleted data. As usual, those matched target photos will be re arranged according to “Sort by: Similarity score/descending” rule, and user will not have any option to change this order. Above the photos list, on the upper right corner, there will be “Keep first ____ matched photos “Go”” option. If the user enters any number there and clicks on “Go” button, those number of photos and associated data should be kept from beginning and the remaining will be removed. The user can enter only positive integers there {decimal, negative number and zero are not acceptable}. However, this option should only appear there if any match is found and there’s more than one matched photos being shown on the page {after deletion with cross button, if any deletion was made}. Also, here the user can only enter a number less than the number of matched photos available. If the user enters a value equal to or greater than the number of matched photos being shown on the page and clicks on “Go” button, he/she will get error, “Value must be less than the number of matched photos”. If the user enters zero, negative number or decimal there and clicks on “Go”, he/she will get error, “Invalid value”.

Below the scrollable box of matched target photos, there will be another scrollable rectangular box titled “Facial recognition JSON results”. {This is however not applicable if no match is found}

JSON response from InsightFace for facial recognition will appear inside this box. The title of the box will be “Facial recognition JSON results”. The box will have a vertical scrollbar to view the entire JSON response.



Example of JSON response is provided at the end of this document. At the end of 5th page, there will be “Back” and “Return to Home” button as well. But for this page, the “Back” button will return the user to 3rd page.

There will be “Generate report” button too. If the user clicks on “Generate report” button, the final report will be generated and will be shown on the 6th page. The final report will not include the photos and associated data removed in preview page.

The button layout is shown below.

Back
Return to Home

Generate report

If the user clicks on “Generate report” button, the final report will be generated and the user will land on 6th page. Even if the subject photo has not matched against any target photo, the user will be able to generate report of that non-match too, even though the report does not show any target photo.

The entire 5th page will also have a scrollbar that will be able to scroll up/down the entire page. So the 5th page will have three scrollbars - one for the entire page, another for the matched photos box and another for JSON results box.

6th page

FaceAI Probe Report

[Export to PDF]

This page will show exactly same report as the previous page. But the page will not show the matched photos removed in the previous page. In this page too, the matched photos will appear inside a scrollable box. But the matched photos will not have a cross button associated with it. And the best matched target photos will be shown first in the list in this page too {Sort by: Similarity score/descending}, where the user will not have any option to change this order. **The matched faces in the target photos as well as the face of subject photo will be marked inside red rectangle.** Also, this page will show the updated “Time of report generation” {software clock time, not PC time} which may not be the same as the time appeared on preview page.

This page will have rectangular box of “Facial recognition JSON results” at the end as usual. {This is however not applicable if no match is found}. This JSON results box will have a vertical scrollbar too.

Additionally, this page will have “Export to PDF” button on the upper right corner. At the bottom of the page, there will be “Return to Home” button.

“Return to Home”

The entire 6th page will also have a scrollbar that will be able to scroll up/down the entire page.

So the 6th page will have three scrollbars - one for the entire page, another for the matched photos box and another for JSON results box.

After the “FaceAI probe report” is generated, the subject photo will be saved in the “FaceAI Media” folder and the case details associated with the subject photo which

includes the Probe ID, Case number, PS, Examiner's name, Examiner's no. and Remarks will be saved in the DB.

If a single valid photo is used as target photo, that photo will be saved in the "FaceAI Media" folder and the case details saved in the DB will be linked to the single target photo, after the "FaceAI probe report" is generated.

If multiple valid photos are used as target, those selected valid target photos will be saved in the "FaceAI Media" folder and the case details saved in the DB will be linked to those selected valid target photos, after the "FaceAI probe report" is generated.

If an entire folder was used as target, all the valid photos inside that folder will be saved in the "FaceAI Media" folder and the case details saved in the DB will be linked to those valid target photos, after the "FaceAI probe report" is generated.

In any case, all images in "FaceAI Media" folder should be linked to DB.

Here, valid photo means a supported image file which is not corrupt.

Please note that latest data will be shown first in "FaceAI Media" folder and in "FaceAI probe report" folder {Sort by: Date modified/descending}.

As you can see, there's an "Export to PDF" button appearing on the upper right corner of the "FaceAI probe report" page. If the user clicks on this button, the software will ask for pdf saving path. The default name of the pdf file will be Probe_report_{Case number}_{Probe ID}_PS.pdf. Here the case number and PS are the data attached to subject photo {submitted in second page}.

For example, this is a sample PDF report layout for matched old case photos:
<https://1drv.ms/b/s!AhESxBnEsNY6dLuQfPrhQ1QqtGk?e=NFC4WW>

In the PDF report too, matched photos maintain rows and columns. And there's fixed square photo frame for single/multiple matched photos. The PDF is legal size document {8.5 × 14 inches}, where the fixed photo frames will have 3 inch per dimension. Font is Arial 12 point. Margins are 0.5" for top, 0.5" for bottom, 0.5" left, 0.5" for right, 0.5" for gutter, while the gutter position is in the left. Header from top is 0.5", footer from bottom is 0.3". In the PDF sample, logo is missing. But in the actual report, you will need to include logo in the header on the upper left corner, but outside the left margin and gutter area. The header also contains "FaceAI Probe Report" text and "Probe ID". Footer of the page will contain page number like this {Page 2 of 7}. The JSON results will appear below the matched photos frames. The JSON results sample provided in the sample PDF is an example only. From CompreFace, you may receive a more detailed JSON response that you will show in the PDF.

When the matched target photos appear inside the fixed square photo frames, the aspect ratio of the photos must be preserved. That means, unless the aspect ratio

of the photo is 1:1, both dimensions of the photo will not fit inside the square frame. One dimension of photo {either width or height, whichever is greater} will fit inside the square frame, while space will be kept blank inside the frame in the other dimension.

If single photo, multiple photos or entire folder of photos are selected as target, there will be some changes in the PDF report layout. Firstly, the following line will be replaced,

“The subject photo has matched to the following old case photos. Respective similarity scores and case details are attached herewith.”

This line will be replaced by, “The subject photo has matched to the following target photos. Respective similarity scores are attached herewith.”

At the same time, Case no. and PS will not appear below the single/multiple matched photos, but row and column layout of the matched photos will remain same.

In any case, the matched photos will be sort by similarity score/descending.

If no match is found either for old case photos or manually selected target photo, the line will be replaced by, “The subject photo has not matched to any old case photo.” At the same time, Probe result will changed to “Not matched”. And no target photo will be listed in the PDF in this case. No JSON result will be included in the PDF in this case either.

Please note that the pdf length can be very long as the probe report can contain unlimited number of matched photos. **The matched faces in the target photos as well as the face of subject photo will be marked inside red rectangle here in this pdf too.**

Furthermore, the maximum length of Case number, PS, Examiner’s name, Examiner’s no. and Remarks need to fit in the PDF. We have designed the PDF layout in such a way also. In the pdf, if a text can’t be shown fully in one line, it will go to next line. For example maximum allowed lines for PS, Examiner’s name and Remarks is 2 lines, 3 lines and 6 lines respectively as you see in the sample pdf layout.

As soon as a “FaceAI probe report” is generated, the pdf of that probe report will be saved inside “FaceAI Probe reports” folder in the “FaceAI data storage” directory. The name of pdf will be Probe_report_{Case number}_PS.pdf. Here the case number and PS are the data attached to subject photo {submitted in second page}. At the same time the pdf file name and path will be written in the DB in order to attach the pdf to the DB. That pdf file will be attached to the case details of the


subject photo in the DB.

As mentioned in the document earlier, the software will have a navigation bar, which will present in all pages. The navigation bar will contain these tabs – “Home”, “Probe Reports”. If the user clicks on “Probe Reports” tab, he/she will be able to see the list of old probe reports. This “Probe Reports” page layout is shown below-

[Logo]

Probe Reports

This page will have a table with the following columns-

 Search
Export all to ZIP
Date and Time Case number PS Probe ID Examiner's name Examiner's no.
Export to PDF

Return to Home

“Return to Home” button will appear at the bottom of the table. If clicked, this button will redirect an user to Home. As we don't know how long {in number of characters} will be the texts in the columns of the table, we have to condition the table to fit with lengthy texts. When a column receives a longer text, the column widens and other columns become narrower. But what if a column receives a very very long text? Should that column become wider and wider while other columns becoming narrower and narrower. The answer is no. You have to set up minimum and maximum width for every column. And no column can cross that limit. Don't make the minimum width so narrow that it can't display full name or mobile number.

Now what if a column receives a text longer than the maximum allowed width of that column? In that case, that text will occupy multiple lines within that column width in a single row of table. As a result, width of that specific row will increase in the table.

Latest probe reports will be shown first in the table {Sort by: Date modified/descending}, user will not be able to change this order.

Using the search box, users will be able to search probe reports using date, time, case number, PS, probe ID, name or examiner's no. At the bottom of the table, there will be pagination buttons. Besides those button, there will be “Go to ___ page” “Go” option there.

If the user clicks on any “Export to PDF” link in the “Export to PDF” column, he will get the option to save the pdf in any folder of the computer. The default name of

pdf is Probe_report_{Case number}_PS.pdf. Here the case number and PS are the data attached to subject photo {submitted in second page}.

If the user clicks on “Export all to ZIP” link, a ZIP file will be created containing all the pdf files inside it. The ZIP folder name will be “FaceAI Probe Reports”. Inside the folder, all the pdf files will be listed. Latest PDFs will be shown first in the ZIP folder {Sort by: Date modified/descending}.

Note: The pages will not contain texts like 5th page, 6th page on its title. But page title must be shown there. The software will not generate additional window for any page. The software will always work on a single window.

Question and Answer

Question: How is old case data restored from encrypted DB and from encrypted “FaceAI Media”, “FaceAI Probe Reports” folders when the software is reinstalled following hardware/software damage?

Answer: If reinstallation of software is needed due to damage to the software or hardware, old case data can be restored if the user has the encrypted DB and encrypted “FaceAI Media”, “FaceAI Probe Reports” folders. These encrypted DB and folders remain saved in user’s hard drive. User can request the company to provide a copy of this backup data from the software’s FTP server too.

In order to restore old case data, the user needs to install the software from the exe file again. Then the user needs to replace the DB file and the “FaceAI Media”, “FaceAI Probe Report” folders of the newly installed software with the backup DB file and backup “FaceAI Media”, “FaceAI Probe Report” folders respectively. Since single encryption/decryption key is hardcoded in source codes, all exe files will use the same decryption key and the newly installed software will contain the same decryption key needed to decrypt the encrypted backup DB file and encrypted backup “FaceAI Media”, “FaceAI Probe Report” folders. As a result, the user will easily be able to access old “Probe Reports” using the “Probe Reports” tab of the newly installed software. And the user will also be able to match a subject photo against the old case photos saved in “FaceAI Media” folder as usual.

Now let me describe a rare scenario {which is highly unlikely to happen practically though}. Let’s say the user has tampered the encrypted DB somehow without

cracking the key or without accessing the DB and some old case data got deleted from the encrypted DB as a result. However, subject photos for those deleted cases remain saved in encrypted "FaceAI Media" folder. Will the software be able to work properly in such situation? Because, what if the user has submitted a request in the software to match a subject photo against old case photos? Let's say, the software finds match against some photos for which case data have been deleted from DB. But as per the instructions given in the codes, the software should show associated case details with every matched old case photo. Won't the software throw errors in such situation? Maybe the software will throw errors.

Similarly, the software may throw errors while trying to match a subject photo against old case photos in case some photos are deleted by the user from "FaceAI Media" folder somehow {without cracking "FaceAI Media" folder encryption} when associated details are present in the DB, depending on how you code the software. We are not sure if an user can actually face such situation. If it's a possible scenario, you have to write programs accordingly to avoid such issue so that software generates probe report with matched old case photo but without associated case details in case the associated case details are absent in DB in such a rare scenario.

Question

What details should "JSON Results" contain?

Answer: About facial recognition JSON response, I am looking for this kind of response

```
{
  "time_used": 467,
  "thresholds": {
    "1e-3": 62.327,
    "1e-5": 73.975,
    "1e-4": 69.101
  },
  "faces": [
    {
      "face_token": "8aa0d0348a6354550c6fdd7f585ee4bf",
```

```
"face_rectangle": {
  "width": 252,
  "top": 170,
  "height": 252,
  "left": 102
}
},
"results": [
  {
    "confidence": 97.079,
    "user_id": "",
    "face_token": "8323ce719cb1129e4abf4ada1129cbc9"
  },
  {
    "confidence": 93.248,
    "user_id": "",
    "face_token": "fd6c81b63615b62b8506f33a6748fd95"
  },
  {
    "confidence": 66.179,
    "user_id": "",
    "face_token": "192672385b603e6b54cf884cd019a620"
  },
  {
    "confidence": 63.912,
```

```

    "user_id": "",
    "face_token": "34bbf05899b53968dcee620aa06a35e7"
  },
  {
    "confidence": 57.821,
    "user_id": "",
    "face_token": "ee6cbca281f449d3ed6040ca63b4c52c"
  }
],
"image_id": "+b1mqy/4tPkV6QMTyRVGyA==",
"request_id": "1672189088,81bb31e6-b8a9-4542-85b7-cd530792d663"
}

```

About the JSON response from Insightface containing the technical data, Insightface must have a function for it. It may be something like .predict function. You have to find it out.

And I think Insightface has its own format of the JSON file with different technical details {maybe}, which you can use. But the JSON data should not be stored in DB. It should be stored in “Temporary data” folder during probe report generation which is automatically emptied each time the user closes the software and re launches it.

Another thing is that, the JSON report should mention the time consumed in facial recognition process. And it’s better if the JSON response contains both the face sizes {in pixels} and angles of faces in pictures.