# VISUM Challenge Guide

VISUM Project Committee

July, 2022

# Contents

# 1 Frequently Asked Questions

Q1. *Should/can I use my own computer to train my algorithms for the competition?*

A1. No, in order to ensure that every team has access to the same computing resources, each team will be assigned its own remote machine (from Google Cloud) with the following specifications:

- 4 vCPUs (Intel Broadwell);
- 15 GB RAM;
- 60 GB disc;
- GPU NVIDIA Tesla T4;
- OS Ubuntu 18.04 LTS.

Q2. *How do I access my remote machine?*

A2. See Section 2 - *"Initial Setup"* and Section 3 - *"Connecting via SSH"* below.

Q3. *Do I need to use any specific programming language and/or software to develop my solution?*

A3. Yes, you must use Python 3 to develop your solution. Basic knowledge of Unix shell commands will also be very useful.

Q4. *Is the required software already installed in my remote machine?*

A4. No. However, if you follow the "Google Cloud Platform" tutorial video provided, everything should be properly installed, including CUDA, Python 3.8, as well as many useful Python libraries (e.g., NumPy, OpenCV, Scikit-Learn, PyTorch, etc.).

Q5. *Can I install further Python packages?*

A5. Yes, you may install whichever packages you want. The recommended way is using pip.

Q6. *Can I work via Jupyter notebooks?*

A6. We do not recommend and strongly discourage the usage of Jupyter notebooks. These often lead to memory problems when multiple notebooks are running on the same machine.

Q7. *How do I submit my predictions?*

A7. You do not have to submit your predictions explicitly. Instead, you must create a submission file for your code to be run by the competition organizers on the test data in a separate machine. Please note that you will not have access to the test data at any time during the competition. It is very important that you read Section 6 - *"Submitting your Solution and Winning the Competition"*, where all instructions regarding this subject are provided. Furthermore, the video "Create Submissions" contains an example of how to create a submission file and upload it to the submission platform.

Q8. *When and how is the leaderboard updated?*

A8. The leaderboard is updated every time you upload a submission. Take into account that you have a maximum of 3 submissions per day. On the last day of the competition (14th of July at 23h59) a final leaderboard will be run considering your most recent submissions. This final leaderboard is run on the entire test set, while the daily submissions are run on a subset of the final test set.

Q9. *Is there any maximum execution time that my inference script should respect?*

A9. Your submission should run in a reasonable time: anything around one hour or less for generating the predictions for the whole training set should be fine.

Q10. *What is the competition deadline?*

A10. The competition is open until **14th July at 23h59**.

Q11. *I have read every section in this document and I still have questions. / I am having technical issues connecting to the machine, etc. Can anybody help me?*

A11. Sure, the VISUM project staff will be on Discord to help you. You can also contact the competition staff at any time via email:

- Eduardo: `eduardo.m.castro@inesctec.pt`;
- Francisco: `francisco.c.silva@inesctec.pt`;
- Helena: `maria.h.sampaio@inesctec.pt`;
- Isabel: `isabel.riotorto@inesctec.pt`;
- Leonardo: `leonardo.g.capozzi@inesctec.pt`;
- Mafalda: `mafaldafferreira@fe.up.pt`;
- Pedro: `pedro.d.carneiro@inesctec.pt`;
- Tiago: `tiago.f.goncalves@inesctec.pt`;
- Tomé: `tome.m.albuquerque@inesctec.pt`.

# 2 Initial Setup

Upon registration in the competition, your team will receive a Google Cloud voucher of 150$. You can find instructions on how to setup a Google Cloud machine in the "Google Cloud Platform" tutorial video provided.

# 3 Connecting via SSH

Once you have your remote machine set up you can access it through SSH. Below you can find instructions on how to do so.

1. Open a Terminal window (Mac and Linux) or a Microsoft Windows PowerShell;

2. Run the command: `ssh <username>@<ip_address>` where `<username>` should be replaced by your chosen username and `<ip_address>` should be replaced with the IP address of your remote machine;

3. If you are asked if you want to proceed with the connection, type yes. Type the password you have defined for your remote machine when you are asked for it.

# 4 Opening and Editing Files

You may use any software installed in your personal computer to access, edit, and visualize any file stored in the remote machine. We suggest Microsoft's Visual Studio Code with the Remote SSH extension (see section Section 4.1 - *"VS Code - All Users"*) to edit (and run) your code and SSHFS to explore the dataset (see section Section 4.2 - *"SSHFS"*).

## 4.1 VS Code - All Users

Follow the instructions on `https://code.visualstudio.com/docs/remote/ssh`:

1. On step 1 under "Connect to a remote host" type your chosen *username* as the username and the IP address of your remote machine (e.g., 35.237.233.98) as the *hostname*;

2. Type the password you have defined when you are asked for it.

Note that all your team members share the same machine and its files, so be careful not to simultaneously access and modify the same file, as this can cause unintended behaviours. If you want to develop your code simultaneously, we suggest Visual Studio Code's Live Share functionality.

## 4.2 SSHFS

### 4.2.1 Windows Users

1. Download and install WinFSP. You can download the installer of the latest stable version directly from **here**;

2. Download and install SSHFS-Win. You can download the installer of the latest stable version directly from **here**;

3. Open File Explorer, right-click on *"This PC"* and choose *"Map network drive"*;

4. Choose a drive to mount at;

5. In the *"Folder"* field, enter: `\\sshfs\<username>@<ip_address>`;

6. Select the option *"Connect with different credentials"* and enter your remote machine's password when asked for it;

7. Now, your remote machine's home directory will be mounted at the Windows drive you have chosen. Confirm you have read and write access to the files.

### 4.2.2 Linux and Mac Users

1. Open a terminal window;

2. Install SSHFS, using the appropriate command according to your OS:

   - **Ubuntu/Debian:** `sudo apt install sshfs`
   - **Mac OS:** `brew cask install osxfuse; brew install sshfs`

3. Create an empty directory in your computer, for instance: `mkdir ~/Desktop/visum`;

4. Mount the home directory of your remote machine at the directory you have just created:
   `sshfs <username>@<ip_address>:/home/<username> ~/Desktop/visum`
   ... Replacing `<ip_address>` with the IP address of your remote machine and <username> with your chosen username;

5. Enter the password of your remote machine when asked for it;

6. Now, the home directory of your remote machine will be mounted at the directory you have chosen. Confirm that you have read and write access to the files.

# 5 Getting Started on the Project

1. Now that you are connected to your remote machine, you are ready to start working on the project!

2. Go to the competition GitHub page
   `https://github.com/visum-summerschool/visum-competition2022` and follow the instructions given on the README file. You may also check the instructions on the "Training Models" video.

# 6 Submitting your Solution and Winning the Competition

For instructions on how to create and upload a submission file, please watch the "Create Submissions" tutorial video.

Note that leaderboards will be generated every time you make a submission (up to a maximum of 3 per day). Such leaderboards are merely informative and calculated using only a fraction of the test data. The final leaderboard will be obtained using the whole test set and will be the only one that the evaluation panel will take into account to decide the winner.

The winner will be determined by a jury of the VISUM organising committee. Your developed models will be evaluated by the following score:

$$visum\_score = 0.5 * mAP_{detect} + 0.5 * mAP_{segm} \tag{1}$$

where $mAP$ corresponds to the mean Average Precision as commonly computed by the Microsoft COCO challenge, i.e. considering all Intersection over Union (IoU) thresholds from 0.5 to 0.95 with 0.05 increments. Both the mAP for the object detection and instance segmentation tasks will be considered.

Based solely on this score, the best teams will be chosen to present their work on the last day of the Summer School (16th of July). Hence, creativity, novelty, and the ability to communicate ideas will also be considered when choosing the winning team. In this edition, by participating in our competition, each team member gets the chance to win a **750€ Amazon voucher**, kindly sponsored by Protocol Labs Research.