

R

## Project S3 - 2015-16 Facial recognition

### Settings/Framework

The project has to be carried out in a group of four (and only four). It will last approximately thirteen weeks (from September until December). This book of specifications introduces the aim and the parts of the project including the different deadlines of completion.

### The subject

The project you will have to carry out is facial recognition software. It allows the user to identify people present in a group photo (class picture for example) and thus to determine the absents to keep the example of a class. The project is focused on two major areas : learning a base face from identity photos and the extraction of these faces from a group photo. The final application will allow the user to load a set of associated faces with the name of the corresponding person to build the *database*. It will also be possible to add new faces or to correct information associated with them. It will finally download a group photo and get the list of persons on the photo.

### Restrictions

This project will be developed under **Linux** and coded in **C**(norm C99). For your project you may use the libraries available or installable directly on the school's rack via the packages, especially the SDL library and its components for loading images and GTK for the graphical interface.

In addition to being technically interesting, and because the subject is the same for all groups, this project will establish a real challenge as to its construction and performance in order to position itself in comparison to the others.

### Protocol

You have to find a group of four people, pick a name for the group, and choose a project subject. Then you have to submit the group name, the name and login of each group member, the project name and the name of the member you designated as project leader (*Deadline for group selection : Friday, 25<sup>th</sup> of September, 2015*). A project leader is required, among other things, as a contact for the jury.

### The presentations

There will be two presentations, 15 minutes each. They will follow one another and, therefore, any delay in starting on your part will lead to a reduction of your allotted time ! So you must be clear and precise when presenting the progression state of your project and answer quickly and as clearly as possible the jury's questions. These two presentations will take place in the evening (starting at 5 :30pm). The presentations will take place in the Villejuif computer rooms only on school machines, on **our** rack (via `git pull`). The only packages / frameworks / extensions / etc. usable are those already on the default dump of your rack or installable following the standard procedure (adding packages on the deposit of assistants laboratory.)

## **Presentations dates**

**First** : week of November 2<sup>nd</sup>, 2015

**Final** : week of December 7<sup>th</sup>, 2015

## **The jury**

The jury for the oral presentations will be composed of Christophe Boullay and Marwan Burelle.

## **Bonus**

Obviously additions and/or modifications can be made in the book of specifications during this project. In particular, it may be appropriate to position the names of identified faces in the photo, to present to the user the unrecognized faces for a manual identification. Finally, to identify people in a class, you will build a database to find all the people to search for on the photo and thus help the identification system.

You may also be interested in the extraction of the faces in a video flow.

# 1 Aim and purpose of the project

## 1.1 What is it ?

This is a search software for faces in a photograph. From a photo, the software will give you the list of people present in the photo who exist in its database.

## 1.2 Principle

Use of the software is divided into two parts : firstly the user will fill the database of faces from which relevant information for person identification will be extracted ; once the database is filled, the software will allow the user to find the list of persons present in a photo.

The software also will help to manage the database by providing addition, deletion or modification operations of people registered in the database.

## 1.3 Rules to follow

So that the development of this project goes as well as possible, observe the following programming rules :

### For the code :

- Your code must be properly indented.
- Identifiers (functions, variables, constants, macros, etc.) must all be in English.
- You will have to cut your code into several units and each file must be accompanied by its header.
- The code should not exceed 80 characters per line.
- No useless space at the end of lines
- No compilation warning

### For the project :

- Your project should have a `Makefile` usable at school without modification. It must be compatible with *GNU make*.
- Your `Makefile` should compile your project by default (call to `make` without parameters or with `all`).
- Your `Makefile` will also allow cleaning the compilation product directory (`./o`, executable files, etc.)
- You may use `gcc` or `clang` compilers
- The code should be compiled with the following options : `-Wall -Wextra -std=C99 -pedantic -O3`.
- Your project should contain at least a `README` file explaining briefly how to compile and run your project.
- Your project should contain a file `AUTHORS` listing the project members, one per line in the form  
\* `login (NAME Firstname)`

## 2 Project partitioning

Here is a project partitioning that will serve you in the distribution of tasks to accomplish :

### First presentation

#### 1. Face processing :

- Face detection in an identity photo (or similar)
- Pre-processing to accentuate interesting features
- Key element detection for analysis
- Building of the characteristic representation of a face
- Advanced option : Detection and cutting of faces in a group photo

#### 2. Construction of a database of face characteristics with associated names :

- Maintenance operations (add, delete and modify)
- Face massive additions in the database (*batch* mode)
- Search for a person from a single face (ID photo or face extracted from a group photo.)

### Final presentation

#### 1. Extraction of the list of persons :

- Loading and pre-processing of a group photo
- Finalization of Detection and cutting of faces in a group photo
- Search for the faces in the database (identification by the name associated with a face)

#### 2. User interface to perform all operations, including :

- Complete management of the database
- Face Recognition(s) on photo (single or group)
- Comparison between two faces

**Note that these tasks are to be carried out in this order. So if one task does not work, then the following ones will not be assessed (graded) !**

## Description of the required documents

**For each presentation** you will hand in :

- A presentation outline,
- A presentation report,
- The project via GIT,

### A presentation outline (for each presentation)

The outline will list every key part and show how your presentation will be conducted. This clearly means that preparation is necessary (at least for time management). An outline has to be handed in to the jury at the beginning of each presentation.

### A presentation report (for each presentation)

It's a twenty page report (minimum) detailing what has been carried out since the last presentation or since the submission of the book of specifications. The layout<sup>1</sup> can be similar to the project report described below. It must be submitted at the beginning of each presentation and has to detail what has been achieved (ahead or behind schedule) and by whom, but also should indicate what needs to be done for the next time.

### A project report (for the final presentation)

It must be submitted during the final presentation and must be 50 pages long excluding annexes (Project sources must be handed in separate from the report). An acceptable layout<sup>1</sup> might be :

- Specification follow-up,
- Different possible layout :
  - Chronological (group),
  - Chronological (individual),
  - Individual (tasks distribution),
  - Others.
- Recap of achievements :
  - Joy,
  - Sadness,
  - Etc.
- Annexes include :
  - Print examples,
  - Screen layouts,
  - Test cases,
  - Etc.

#### **Remarks :**

Whatever layout chosen for the report (chronological, individual, etc.), you must describe CLEARLY who did what.

## The project

The project has to be recoverable on the git, and compilable on **our** rack.

---

1. All presentations whether oral or written must include an outline, an introduction and a conclusion.