

CS 640 Project (Fall 2019)

In this assignment, you are about to finish a project related to computer vision.

The project will be graded on:

- the methodology of solving a problem,
- how much work has been done,
- performance of your designed system.

There are two options you can choose:

- Facial expression analysis based on videos of presidential candidates.
- A self-chosen computer vision topic

For the first option, you are asked to complete a video classification project related to the 2020 presidential election. The second option is a computer vision topic decided by yourself.

Option 1:

In this project, you are asked to design an AI system that can automatically analyze facial expressions. You will work with recent video clips showing 11 presidential candidates of 2020 in the United States. You are required to finish three stages of the project step by step:

Data Annotation:

Creating data is an important step in any computer vision project. Every student will be assigned a set of simple annotation tasks. The results will be shared with the class at the end of week 1, so that everybody can use them for training and testing of deep neural networks. You will use Amazon Mechanical Turk to annotate the data. We will send out separate instructions about how to use the platform later.

Model Development:

You will research deep models on facial expression analysis. You do not have to start from scratch. Instead, you will download existing models provided by the computer vision community and try them out. Use the data annotated in week 1 to help discover and choose the best performing model.

Polishing your model and create interfaces for evaluation:

Further finetune your model to improve the performance. Search for the optimal set of hyperparameters for your model on the provided data.

Writing your report

More details on report at the end of this document.

Option 2:

You select your own project. We suggest you complete the project by the following steps:

Identify your problem:

You need to choose your project based on your **available time** (at least 8 hours per week) and **skills**. Feel free to talk to Professor Betke or TFs if you need help. A good topic should be specific and doable in one month. You will give a proposal for your project to TFs **by the end of the first week**. You may finish that during office hours or in a detailed, well-written email.

Background Investigation:

In week 2, you should start working on your project. Find the relevant papers or research works on similar computer vision problems. Try out available tools, code libraries, and datasets.

Coding and Experiment:

In week 3, you should start designing and implementing experiments based on the work of week 2. Your experiments should be thorough so that you will gain deep insights into the problem.

Writing Report (week 4 suggested):

More details on report at the end of this document.

Report

A big portion of your grade on this project comes from your paper-style report.

You can use any template (eg. AAI, NIPS, etc.) to write your report. If you write a report on Overleaf, you can easily import a template provided by them. You can also find these templates simply by searching with a query like “NIPS template”.

When writing, you should follow a general paper structure, which means the following must be included: (1) An **abstract** and **introduction** explaining the idea and contribution of your project, (2) an explanation of the **related works**, (3) a detailed description of your **method**, (4) a description of your experiments and **experiment results** of your method in words, numbers, and figures, (5) a **discussion** of your results and observations, (6) **conclusions** and ideas for **future work**.

Your report may not be long, but it must be complete.

Grading Criteria

Here is a breakdown of the grading criteria.

Index	Weight	Option 1	Option 2
1	10%	Your performance should beat the baseline (accuracy \geq 60% for each class).	The project idea is interesting and challenging.
2	10%	Your presentation is clear.	
3	80%	<ul style="list-style-type: none">Your report may not be long, but it must be complete. (10%)The problem statement or definition is clear. (5%)At least four related works are included. (5%)The description of your method is clear. (10%)A significant amount of work on experimenting is done and presented via visual and/or numerical outcomes. (20%)Your results are reasonably good. (10%)	

		<ul style="list-style-type: none">• Your discussion of the methods and results is thorough and clear. (20%)
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Turn-in

You should submit your code and report by the deadline indicated on our course website.

If you are using a third-party model, do not include it in the submission, as the file can be very large. Instead, cite the model in your report.