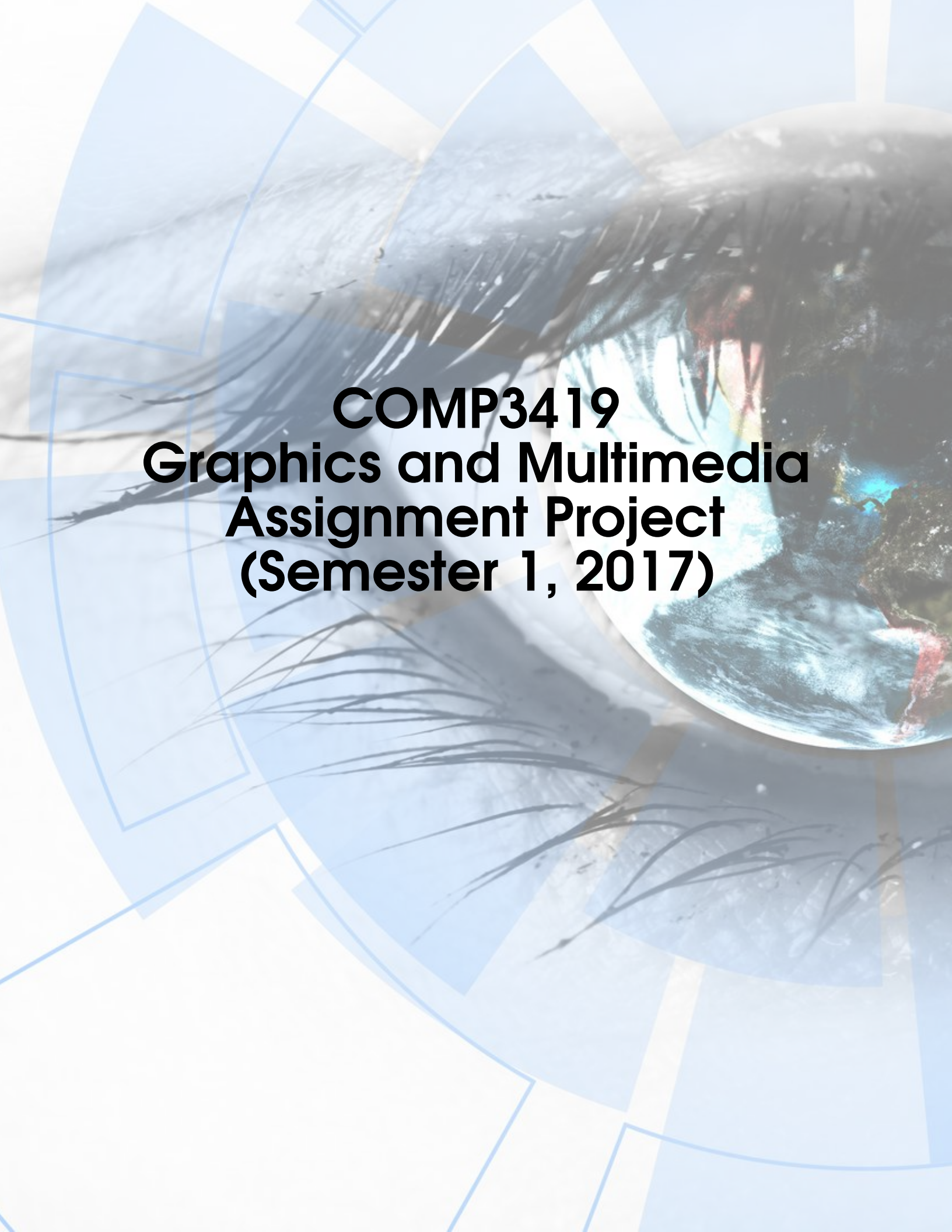
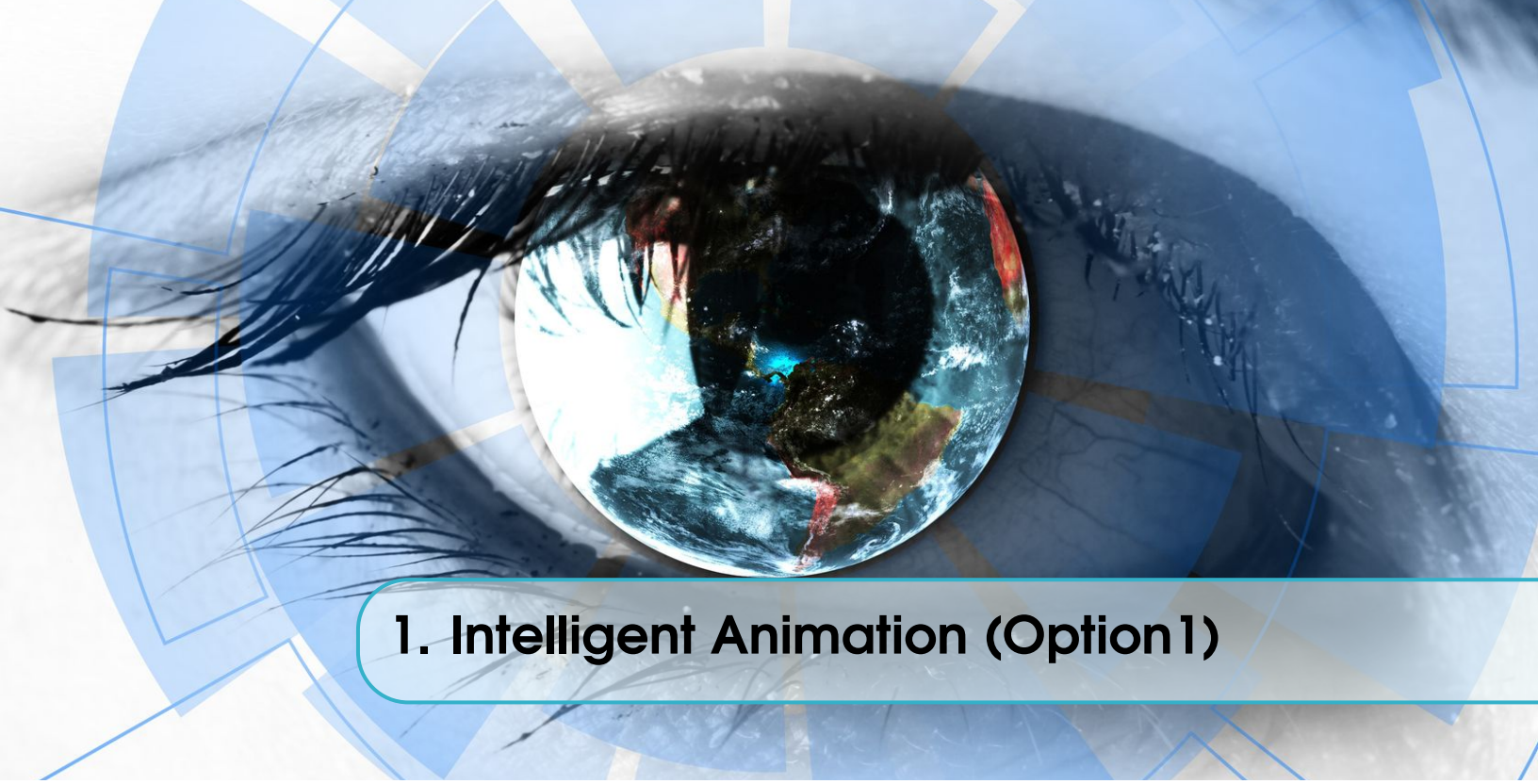


COMP3419
Graphics and Multimedia
Assignment Project
(Semester 1, 2017)



1. Intelligent Animation (Option1)

1.1 General

This is an individual assignment (Option-1) and worth 25% of the total assessment of this unit of study. In this assignment, you are required to program a short video involving digital video processing, compositing and 2D animation techniques. The output video is a piece of animation based on a provided video clip. You are welcome to use ANY programming languages to complete your assignment.

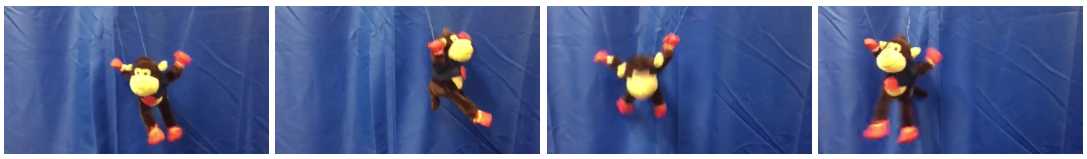


Figure 1.1: Some example scenes of the input video.

1.2 Main Objectives

1.2.1 Motion Capture

[5%] The body of a monkey is labelled with red markers. Segment the red markers/the monkey and use the coordinates of them to track the body motions. Some morphological operations might be needed to enhance the segmentation of the red markers. Alternative strategies can also be used for motion capturing, e.g., optical flow, boundary detection, etc. Design a data structure to represent the sequence of the captured body motions.

1.2.2 Replace Background and Marionette

[7.5%] Replace the blue background with your own dynamic background which can be programmed animations or a video. Render your own character to replace the moving monkey according to the captured motions in a new video. You should use the animation techniques (will be introduced in

labs) to achieve this and simulate the gestures of the monkey as much as you could. The replaced character should have at least five connected components, including a body, two arms and two legs.

1.2.3 Intelligent Objects

[5%] Add at least two types of randomly moving objects to your video to interact with the moving marionette in two different ways (e.g. collision, tracking, etc.). The interactions are effected by the motions of both of the added objects and the marionette. [1] Trigger special effects when interactions happen using image processing techniques. More Intelligent objects are encouraged. The marking will depend on the design of intelligent objects and their interactions.

1.2.4 Sound Track

[2.5%] Program at least two sound tracks for your video. The sound tracks should be related to the interactions between the moving objects.

1.2.5 Technical Report

[5%] Draft a 4-6 page technical report to demonstrate your pipeline. The main sections of report should at least include Introduction, Implementation and Conclusion. The implementation can discuss the algorithm and your experimental results. Your report should be written following the scientific style and formatted with LaTeX. Do not panic about the LaTeXand it has similar syntax like html. You can find a handy online latex editor at `https://www.sharelatex.com/`. An alternative choice is overleaf which can be found at `https://www.overleaf.com/`.

1.3 Constraints

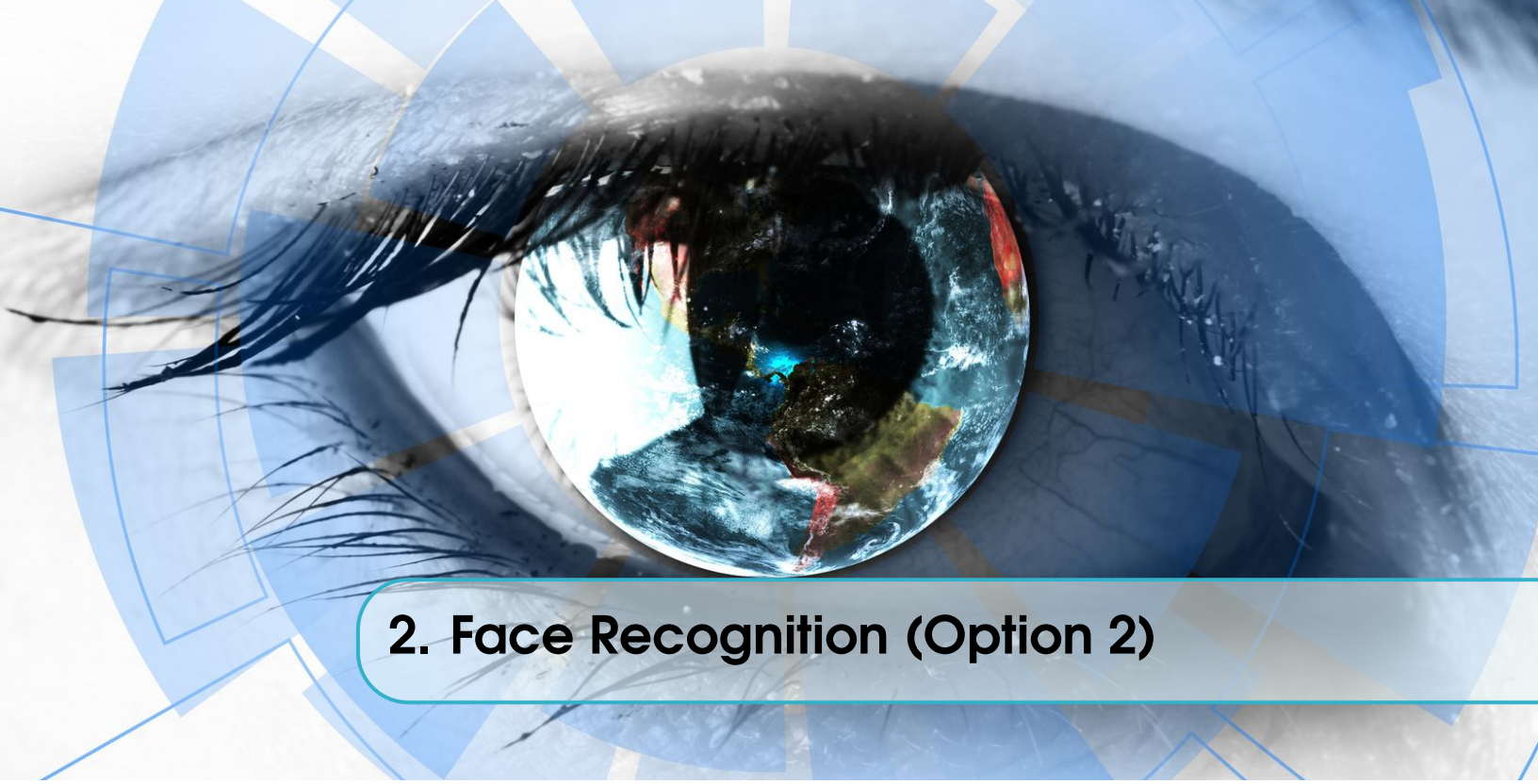
- The output video should have the same length as the provided video clip.
- The motions of your own character should be determined by the original marionette.
- The usage of libraries is only permitted for I/O purposes and low-level mathematical operations.

1.4 Deliverables

All deliverables should be submitted via the e-Learning system. Your assignment will only be marked if all the deliverables can be accessed through e-Learning System. Late submission will not be accepted.

- All the related source code and a runnable demo program.
- A pdf technical report formatted with LaTeX.
- A live demo in week 12 during the lab time and an example output video.

[1] Hints: Consider controlling the movement speed of your objects after interactions.



2. Face Recognition (Option 2)

2.1 General

This is an individual assignment (Option-2) and worth 25% of the total assessment of this unit of study. In this assignment, you are required to build a prototype of real-time face recognizer. You are required to implement a face recognition framework with Eigenface and multi-scale sliding window. However, you are welcome to try out different alternatives. Some supporting materials and data will be provided throughout the semester during the lab time. 5% bonus marks will be given to excellent solutions. You are welcome to use ANY programming languages to complete your assignment.

2.2 Main Objectives

2.2.1 Data Preparation

(Baseline) True positive face images will be provided for training the your face recognition model. To train a face classifier, you also need to prepare the false negative image patches. The negative patches can be randomly generalised or randomly sampled from online images.

2.2.2 Face Classifier

[5%] Train a face classifier to distinguish faces and non-face patches using the Eigenface method and a k-nearest-neighbour classifier. An example of eigenface is shown in Fig 2.1. However you are welcome to discover more advanced algorithms once you have the required method implemented.

2.2.3 Gender Classification

[5%] For each recognised face, build another classifier to classify the gender of him/her and show the results beside the bounding box. In terms of this gender classification, the fixed scale face input is acceptable.

Figure 2.1: An example of eigenface basis.

2.2.4 Multi-Scale Recognition

[5%] Use multi-scale sliding windows to detect a single face in an image using the classifier you build. The detected face should be labelled with a box showing the size and coordinates. You should fine-tune the classification framework according to your face recognition results and consider special cases such as rotation and overlapping. Once your framework works for a single person, apply it to an image with many faces.

Figure 2.2: An example face recognition on the image of Solvey conference 1927.

2.2.5 Real-Time Recognition on Camera Streaming and other Creative Effects

[5%] Embed your trained framework with a camera video stream and demonstrate it to work in real-time. An effective demonstration of real-time face recognition is enough and the accuracy is tolerated within a certain range. The real-time recognition is just an example and other creative ideas might be applied here and the marking will depend on your demonstration.

2.3 Technical Report

[5%] Draft an 6-8 page technical report to demonstrate your pipeline. The main sections of report should at least include Introduction, Implementation and Conclusion. The implementation can discuss the algorithm and your experimental results. Your report should be written following the scientific style and formatted with LaTeX. Do not panic about the LaTeXand it has similar syntax like html. You can find a handy online latex editor at `https://www.sharelatex.com/`. An alternative choice is overleaf which can be found at `https://www.overleaf.com/`.

2.4 Constraints

- You are welcome to use any programming languages to complete this assignment. You are encouraged to use low-level mathematical libraries only.
- The usage of other libraries are only permitted if you can demonstrate the algorithms and they are not included in the basic pipeline above.

2.5 Deliverables

All deliverables should be submitted via the e-Learning system. Your assignment will only be marked if all the deliverables can be accessed on e-Learning System. Late submission will not be accepted.

- All the related source code and a runnable demo program.
- A pdf technical report formatted with LaTeX.
- A live demo in week 12 during the lab time and a demo video (the demo video should be shorter than 2 miniutes and smaller than 100MB).