Project B: Frequently Asked Questions
ECE1512 Digital Image Processing and Applications
Department of Electrical and Computer Engineering
University of Toronto
Fall 2022

Q. What is this FAQ about?

A. We are all going through a difficult time and, in our own way, trying our level best to keep up with things. To that end, this FAQ serves as a guide for helping you with Project B and answer any urgent questions which may arise. In the special case when you have a lot of deadlines or submissions coming up, this FAQ will try to throw light on (almost) all of your questions and concerns which you may have during the course of Project B. In case you have a question, which is not listed in the FAQ then feel free to post it on the discussion board. We will try our best to address your queries and update this document so that it helps your classmates.

Q. Where/Whom should I ask my question?

A. In case you have a question, please check this FAQs page first. If you find your question not listed in this document, then post it on the discussion board. Additionally, you can reach out to the TA directly at ahmad.sajedi@mail.utoronto.ca with **"Project-B"** as your subject line. The TA will respond to your queries as soon as possible.

Do I need to submit the supplementary material?

A. It is highly encouraged that you submit additional material such as your code base, presentation slides, 1-page summary or a small video presentation. This will help the course staff get a much clearer idea of the objective and contributions of your project. Supplementary material such as code base will highlight your ideas implemented as programs, which are enough validation for the suitability of your method. Furthermore, supplementary material such as video presentation and 1-page summary will help you convey your ideas in a more articulate manner.

What should I submit as part of the supplementary material?

A. A good *supplementary.zip* file must consist of code base packaged and initialized with a *README* document. Additionally, you could provide presentation slides, 1-page summary, video presentation, informal blog write-up, additional results or even ideas which you tried but did not work.

Q. How will you grade our projects?

A. A grading breakdown for each task and its components is provided in the Project description. These grades correspond to the complete project.

Q. What will be a good way to approach the Project?

A. The project consists of two types of questions: (1) which test your basic understanding about the subject and (2) which test your ability to improve image processing pipelines. A good way to approach the project would be to move sequentially (from (1) to (2)) since the questions build on themselves. In the unusual case when you find yourself thinking too much on a question, try to be brief and answer from a qualitative perspective. The emphasis of the project is on you implementing your ideas coherently in Python and improving the algorithm by gaining intuition about its limitations.

Q. What to do if I am struggling to infer results and implement any new ideas?

A. To infer the results correctly, try to understand what objective the task is trying to accomplish. This can be done by studying the starter code, looking at test images, and trying to interpret the model's activations. Essentially,

it is a "hide-and-seek" problem wherein the answer is often in front of us, but we tend to overlook and emphasize too much on the details. To implement new ideas, a good place to start would be by studying the baseline model. The model provided in the starter code is itself a good image recognition pipeline and motivated by prior works in literature. You could read up on these models and try to come up with some ideas. However, the emphasis is improving the model and not necessarily creating something new.

Q. The project description says that there are no GPU requirements. However, tasks includes training a deep learning model. Why is that the case?

A. The motivation behind training deep learning models is to equip you with the tools and techniques required in the construction and improvement of image recognition frameworks. Training is an essential part of the model and cannot be overlooked simply because of its computational requirements. In the interest of time, you are only required to train models for a simple dataset (MNIST) as well as the simple architecture. I task 2, you do not need to train the models from scratch. Wisely, use a transfer learning pipeline to train the models.

Q. I am in a different time zone and find it very difficult to collaborate on the project. What suggestions would you have for me?

A. Collaboration on projects is purely based out of choice. You can proceed with projects on your own. However, due to the graduate course load, we strongly suggest students to form a group. In case you are having trouble collaborating with your teammate, then this is something you should discuss with them at the earliest.

I am having difficulty accessing the Colab GPU. Would you have any suggestions?

A. Please cross-check the following:

1. Your folder is uploaded to your *Google Drive*.
2. The *Colab* notebook can access the folder using *drive.mount* command. If not, then please refer to Colab documentation for this step.
3. The security code you copied and entered for validating your Google account is correct.
4. The GPU accelerator is turned on in the Runtime Environment.
5. All tensors and models are on the GPU memory.

Q. I would like to leave some suggestions/feedback for the course. Where/How can I do this?

A. The course staff would be more than happy to get your feedback on the course and improve it for future offerings. Towards the end of the term, the ACORN system will provide you with a course evaluation survey wherein you can leave comments and suggestions about the course. We would like to hear your views on improving the project framework.

Q. My experiment does not demonstrate improved performance but addresses the limitations of the model. What should I do?

A. This is okay. As long as your implementation is pragmatic and aims to address the limitations of the model, then you can proceed with the experiment. The ultimate goal is to not achieve state-of-the-art performance, but only to gain intuition of how it may be achieved.

Q. What would be a good way to debug my code?

A. Following is a list of good practices to debug your implementation of the architecture:

1. Make sure that the dimensions of your tensors are correct and do not cause any error. A good way to do this would be by monitoring their shape after every operation.
2. Print the output at intermediate levels to keep check of whether you are headed in the right direction or not.
3. Try training the model for 2-5 epochs first to see if your metrics are moving in the right direction.
4. Generally there can be 2 kinds of errors occurring in TensorFlow or PyTorch:
   (a) ones which come from your model;
   (b) ones which might be due to a bug in the starter code.

   If your code points you to a line which is not written by you but related to your model, then it is potentially an error due to dimensions of tensors being used by your model.

5. If you are certain (and by certain, we mean completely sure) that the error is not on your part, then please reach out to the TA by answering the following 3 questions:
   (a) What version of TensorFlow or PyTorch are you using?
   (b) Have you tried the code on your local machine?
   (c) If your dimensions match, then what do you think is causing the error?
6. If you are using Colab for the project, then please be aware that Colab uses a notebook environment. The project was primarily developed for a local machine usage so that you can complete it within the required time and in the absence of a GPU. Colab makes use of different environment variables which contain tensor broadcasting among tensors

In case you have any questions that are not listed in this FAQ, please post them on the discussion board or contact the TA via email with "Project-A" as the subject line.

All the best with your project.