



Deep Learning
Final Project
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Amir Jafari
Due: *Check the Syllabus*

Final Project

The objective of the final project is to apply what you have learned in this course to a real world problem – a problem in your area of interest. You can apply any deep learning network or framework that we cover in the course. Below is a list of websites that contain data sets that might be suitable for deep learning.

Websites with datasets

List of key topics you can choose for your final project.

- **Speech Recognition** (Deep Speech, Wav2letter, ESPnet,..)
- **Computer Vision** (Pre-trained networks, Imagenet, Inception, Tabnet, VGG, Resenet, Efficient net, NASnet, googlenet, Mobile net)
- **Interpretability and Explainability** (LIME, SHAPP, Class Activation, DeepLift)
- **Autoencoder**
- **General Adversarial Network**
- **Recurrent Network** (LSTM, GRU, Vanilla)

You can search papers with codes and do literature review. Also, you can find data either in Google data search or kaggle competition website.

Trending Research

<https://paperswithcode.com/>

Dataset Search

<https://datasetsearch.research.google.com/>

1 Group

1.1 Group Proposal

After you have selected a topic, a network, and a data set, submit a proposal of what you plan to do for the project. The proposal should be a few hundred words, and should address the following items.

- What problem did you select and why did you select it?
- What database/dataset will you use? Is it large enough to train a deep network?
- What deep network will you use? Will it be a standard form of the network, or will you have to customize it?
- What framework will you use to implement the network? Why?
- What reference materials will you use to obtain sufficient background on applying the chosen network to the specific problem that you selected?
- How will you judge the performance of the network? What metrics will you use?
- Provide a rough schedule for completing the project.

1.2 Group Presentation

You will give a 15 to 20 minute presentation of your final project.

1.3 Group Final Report

1. Introduction. An overview of the project and an outline of the report.
2. Description of the data set.
3. Description of the deep learning network and training algorithm. Provide some background information on the development of the algorithm and include necessary equations and figures.
4. Experimental setup. Describe how you are going to use the data to train and test the network. Explain how you will implement the network in the chosen framework and how you will judge the performance. Will you use minibatches? How will you determine the size of the minibatches? How will you determine training parameters (e.g., learning rate)? How will you detect/prevent overfitting and extrapolation?
5. Results. Describe the results of your experiments, using figures and tables wherever possible. Include all results (including all figures and tables) in the main body of the report, not in appendices. Provide an explanation of each figure and table that you include. Your discussions in this section will be the most important part of the report.
6. Summary and conclusions. Summarize the results you obtained, explain what you have learned, and suggest improvements that could be made in the future.

7. References. In addition to references used for background information or for the written portion, you should provide the links to the websites or github repos you borrowed code from.
8. A separate appendix should contain documented computer listings (code).

1.4 Deliverables

The Group Proposal will be due 2 weeks after final project description is posted. For Group Final Report and Group Presentation check the syllabus.

- Make a folder and name it [Group-Proposal](#). Write your final group proposal in a word document and save it as a PDF file. Place the group proposal in the [Group-Proposal](#) Folder.
- Make a folder and name it [Final-Group-Project-Report](#). Write your final group project report in a word document and save it as a PDF file. Move it to the [Final-Group-Project-Report](#) folder.
- Make a folder and name it [Final-Group-Presentation](#). Create a powerpoint presentation for your group presentation. Save the presentation as a PDF file and move it to the [Final-Group-Presentation](#) folder.
- Make a new folder and name it [Code](#). Save all of your codes for the final project in it. For example, if you write code for multiple parts of the project, name them properly and write a [README](#) file for it. This [README](#) file should explain what order codes need to be run in (e.g., codes to fetch data should be run first, then code to preprocess, and then modeling, etc.) and a short description of what each script does.
- Have one group member create a GitHub repository for the project and name it [Final-Project-GroupX](#) where X is your group number (The rest of the group members can be added in as collaborators and fork it, so you only need one repo for the project). Then, push the 4 folders that we discussed above into the repository that you created. You should have a markdown file (`README.md`) that explains the structure of the repository and how it works. Make it as clear as possible.

2 Individual

2.1 Individual Final Report

1. Introduction. An overview of the project and an outline of the shared work.
2. Description of your individual work. Provide some background information on the development of the algorithm and include necessary equations and figures.
3. Describe the portion of the work that you did on the project in detail. It can be figures, codes, explanation, pre-processing, training, etc.
4. Results. Describe the results of your experiments, using figures and tables wherever possible. Include all results (including all figures and tables) in the main body of the report, not in appendices. Provide an explanation of each figure and table that you include. Your discussions in this section will be the most important part of the report.
5. Summary and conclusions. Summarize the results you obtained, explain what you have learned, and suggest improvements that could be made in the future.
6. Calculate the percentage of the code that you found or copied from the internet. For example, if you used 50 lines of code from the internet and then you modified 10 of lines and added another 15 lines of your own code, the percentage will be $\frac{50 - 10}{50 + 15} \times 100$.
7. References.

2.2 Deliverables

- Write your individual report in a word document for your contributions to the final project.
- Save this word document as a **Single PDF file** and rename the PDF file as **firstname-lastname-final-project**. Then create a folder titled **Individual-Final-Project-Report** and move the PDF file of your report into it.
- Create a new folder titled **Code** and then put all of your codes into to it. For example, if you wrote code for a portion of the project, put the code in a script, `mywork.py`, and move it into the **Code** folder.
- Make a new folder and name it **firstname-lastname-individual-project**. Then, move the above two folders into this folder. Finally add this folder to the GitHub Repo.
- Failing to do these steps properly will result in a **reduced grade**.

3 Uploading

- **One member of the group have to upload the GitHub repo link (includes all the folders above) into BlackBoard. Please check that the link is working before uploading it.**