ECE416/5316/CS5590NN
FS 2019
Final Activity: Paper and Video Presentation Guide

Here's our wrap up:

This is a <mark>feasibility assessment project</mark>, an overview to show what you might do if you were trying to determine if a machine learning solution would be a good fit for some data provided to you in some future scenario.

→*Scenario: A client has enlisted you to provide some assistance with some data they've collected. Utilizing a camera outside their store, they have collected images of the clothes their perspective customers are wearing. These cloths fit in 10 categories and have designer names or team names containing English letters, and numerical data such as athlete's player numbers on them.*
To improve their sales, the company wants to base their purchasing decisions on what they believe these perspective customers want by offering them things similar to what they are already wearing.
Build a series of models that can provide reliable classification of the elements provided by the customer and generate a white paper and short pitch video of how your classifiers work.

This is an <u>evaluation of your understanding</u> of the process of Neural Networks application.
Code implementation will be minimal, but you must justify the parameters you choose to train the networks with.

I will assist with code based issues, but only to resolve errors in execution of the provided scripts. All questions must be asked for specific issues, the error codes must be copied from the matlab command window, and the associated code must be uploaded with your question as an '*.m' file that can be executed in the data set directory.

<u>Don't go overboard on any one aspect of the work.</u>
This is equivalent to a final exam, so factor in what time you would normally spend studying and sitting to take the exam and allocate roughly that amount of time. (I estimate the activities should take less than 3 hours total to complete – code run time included – if you are spending significantly more than that, consider contacting me for insight).

You will be writing a **short**, technical report (white paper) *containing* and *explaining* your results **<u>as if you were reporting your findings to a project manager or client</u>**.

[IMPORTANT: This paper and your associated verbal explanation of it will be considered as both a final project and a take-home exam, and thus should be treated accordingly.]

This paper will act as a supplement to a 5 - 8 minute video explaining what you did, and how well it worked.
<mark>If things didn't go as planned, don't panic!</mark> -- Use your paper, and your video as a way to explain what didn't work and how you would fix it if the project were to be extended.

The goal of the video is to demonstrate how well you can explain your results and observations using the theory taught to you earlier during this course.

Your explanation should focus on the data and code posted on Canvas as → "Final Exercise"
The **medical data project** will be submitted as a separate deliverable.

Paper specifications:
Focus your time on being clear and concise rather than the word count.
Length: ~ 450 - 700 words [1 ½ - 2 ½ pages] (graduate) / ~ 300-500 words [¾ - 1 ½ pages] (undergraduate) 12 point, single space, san serif font. Your paper should also contain figures, tables, formulas explaining the process and results of your work.

Provide *numbered* captions for all your figures (on bottom), tables (centered on top), and formulas (to their right) and reference them *accordingly* in the text. (This is an easy word tutorial)

Your conclusions should be rationally or experimentally justified: if it the statement has a novel claim which is uniquely yours, put forward your logical/mathematical/experimental argument for it.
All material provided from a literature or web source, either directly or implied, should be provided as an in text citation in IEEE style *(e.g. [1])*.

The writing needs to be your sole original work, please see your syllabus and contact me should you have any questions regarding academic rules and plagiarism.

🎤 You need to expand upon four simple <u>but critical</u> points (**bold and underlined**):
1-**What** (precise problem statement)
2-**Why** (importance of the subject matter, AND importance of your approach)
3-**How** (your data and methods, described to the level that your experiment is reproducible by your audience)
4-Discuss and **Justify** your results--THIS IS THE IMPORTANT PART

Paper and Video Structure:
Here's what you'll give me on Canvas – This paper and your Video will be the only submitted items.

Title: Generate a relevant title: such as "Transfer Learning and Deep Neural Networks for Character and Object Recognition" (you may change this suggested titles if you wish) – State this title as the project title in your video.

Your name and declaration of sole authorship (DON'T FORGET THIS!): **You need to be sure to include that you wrote the whole paper by yourself, in your own words, and that all external knowledge and literature has been referenced properly in the text.** This should be part of your video intro – tell the viewer who you are.

Abstract: A snap-shot of the whole paper, in 50 words or less. A short but precise summery of the project and computational methods (e.g. different CNN and / or NN methods used) -- finish by one sentence which states your main conclusion for the reader based on the project scenario. Include a 20-

30 second synopsis (overview) of this section in your video – don't read the whole thing, just get to the main points.

Introduction: (**What and Why**) Describe the dataset, and include a few sentences (no more than 1 paragraph) about importance of machine learning and its applications. Spend 20-30 seconds explaining the strengths and weaknesses of MNIST like data. Show examples in your visual presentation and explain how they influenced your parameter selection for the models you used.

Methods: (**How**) Precisely and concisely describe data preparation and classification methods used, including the ones you were supplied – try your best to explain how the data got to your model. One paragraph for each method (max 2-3 sentences), accompanied by corresponding figures, plots and tables of results. Include any relevant formulas with descriptions of their elements. Spend 20-30 seconds on each step project step (2 minutes max).

Results and Discussions: (**Analysis and Justification** of *__Results__*) This is the main focus of your paper and what you will discuss in your video. Discuss the results of your experiments and observations from all the cases you tried for your project.
What types and ranges of classification parameters did you try in each case, and why?
What trends did you see?
Justify by referring to the theory from class – you can cite your textbook to make your point, but don't just replicate things you don't understand.
Spend 30 seconds to 1 minute answering and making recommendations based on the questions above (3 minutes max).

Conclusion: Provide an overview of your whole project in a sentence or two -- finish by your major conclusions for what your reader should "take away" from your efforts.
(for example – what are the capabilities and limitations of the methods you used [in your experience]).
Spend 30 seconds to 1 minute providing your assessment of the methods you used to solve the problem provided to you in the project scenario.

References: Include references to every source you use (IEEE style –be sure to **include your text book**)
Examples:
[1] A. Subasi, "EEG signal classification using wavelet feature extraction and a mixture of expert model," Expert Systems with Applications, vol. 32, pp. 1084-1093, 2007.
[2] J. C. Príncipe, et al., Neural and adaptive systems: fundamentals through simulations. New York: Wiley, 1999.
[3] I. Goodfellow, et al. Deep Learning. Cambridge: MIT Press, 2016.
Display a slide or image showing all resources you used to generate your paper and any figures or examples in the video.

Grade Rubric Below:

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Grading:

1. Quality of writing (clarity of concepts and sentences, using correct technical English, logical organization, flow, and presentation of the ideas and findings): 15%
2. Adequacy of the abstract and introduction: 5%
3. Accuracy and technical depth of material presented in the "Methods" section: 20%
4. Completeness of the discussions and justifications in the "Results and Discussions" section: 30%
5. Clarity and focus of the "Conclusion" section on the task as presented: 5%
6. Video Presentation: 25%
   a. Total time (not less than 5 and not more than 8 minutes): 10%
   b. Clarity and Accuracy of Concepts: 5%
   c. Format (as included in blue highlighted elements): 5%
   d. Informative Visual aids – figures, tables and diagrams: 5%