DD2424 - General Instructions for the Final Project & Report

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1 Goal of the project

The outcome of this project will be a scientific report. The goal of the work is multi-fold:

- Apply a deep learning model/network to a computer vision, speech, natural language language, multi-modal, ... task.
- Study the literature regarding the state-of-the-art for the sub-problem you have chosen and summarize it.
- Conduct scientific experiments and obtain concrete results.
- Familiarize yourself with the process of a scientific endeavor.
- Collaborate on experiments and co-author a scientific work.
- Practice scientific writing.

The experience you gain through this project will help you with your master's thesis. Also, it will be a good practice for future technical writing should you choose to pursue a PhD degree or join an industrial lab. A large portion of research is devoted to writing up and explaining your work. Finally, hands-on experience with deep learning will boost your skill set for a future career in industry.

2 Format of the final report

The final report should be between 6-8 pages (including references) using the provided template, structured like a paper from a machine learning conference (NeurIPS, ICML, etc). We have included a slightly *hacked* version

of the nips style file for you to use. The following is the suggested structure for your report:

- **Abstract**: Give an overview of the task, approach and the key results and findings of your work. Should be no more than 300 words.
- **Introduction** (10%): Describe the problem you are working on and why it is important. Then also briefly describe what you did and give an overview of your results.
- **Related Work** (10%): Discuss the published work related to your project work.
- **Data** (10%): Describe the data you are working with for your project. What type of data is it? Where did it come from? How much data are you working with? Did you have to do any preprocessing, filtering, or other special treatment to use this data in your project? If you are using a very standard dataset (Cifar10 etc) then you should focus on describing the state-of-the-art performing methods on the dataset.
- **Methods** (30%): Discuss your approach for solving the problems that you set up in the introduction. Why is your approach the right thing to do? Did you consider alternative approaches? You should demonstrate that you have applied ideas and skills built up during the course to tackle your problem of choice. It may be helpful to include figures, diagrams, or tables to describe your method or compare it with other methods.
- **Experiments** (30%): Discuss the experiments that you performed to demonstrate that your approach solves the problem. The exact experiments will vary depending on the project, but you might compare with previously published methods, perform an ablation study to determine the impact of various components of your system, experiment with different hyperparameters or architectural choices, use visualization techniques to gain insight into how your model works, discuss common failure modes of your model, etc. You should include graphs, tables, or other figures to illustrate your experimental results.
- **Conclusion** (5%) Summarize your key results - what have you learned? Suggest ideas for future extensions or new applications of your ideas.

3 Logistics of the project

3.1 Rules

The constraints on the project are as follows

1) Groups should consist of 3 students.

2) The final task should be related to applying deep learning to some sort of *recognition, synthesis, translation, segmentation* ... task and/or investigating some aspect of training, network architecture, etc. (**Projects with a main focus on Reinforcement Learning are not acceptable.** There is a reinforcement at KTH you can take if you are interested in exploring RL.)

3) The two deadlines for the project are

i) Submission of your project proposal. **April 12, 2019**

ii) Submission of your final report and project. **May 17, 2019**

If the final project report is submitted after the deadline, then we will need to schedule the oral exam in the late Summer/early Autumn.

3.2 What you must submit for the project proposal

The project proposal you submit should be brief and to the point. Its length should roughly be .5 - 1 page. You should submit one proposal per group. I just want to know that you are going to explore a feasible and in scope idea. It should contain the following information:

- The names of the people in the group.
- A working title for the project.
- A brief description of the problem that you will work on and how you will try to solve it. Reference to at least one paper (or webpage) that provided inspiration as regards the problem statement and/or proposed approach to tackling the problem. (It is completely fine if you just want to replicate results of some paper and explore the influence of parameter settings, training conditions, see if the method can be transferred to another dataset etc...)
- The training data that you will use for training, validation and testing. (In most cases this training data should be labelled.)
- The software package(s) you will use to build your deep learning network(s).
- How much of the software implementation your group will write itself.
- The initial set of experiments you will run.
- How you will measure the success of your project.

- Specify for each group member the skills/knowledge they would like to acquire from completing the project.

3.3 What you must submit with the final report

Each group must submit the following items through Canvas:

i) A final pdf report following the provided template.

ii) A link to a repository where you have your code.

4 Project help sessions

The goal of the project is to get experience specifying, planning and completing a deep learning project within a team.

Fifteen minute time slots will be available for consultancy on the following subject before the project starts:

- On the problem you want to tackle.
- The available techniques to solve that problem.
- Feasibility of your possible project idea.
- Software package to use.

and once your project proposal has been accepted:

- Software implementation issues.
- Algorithm implementation issues.
- Advice on how to proceed given success/failure at prior stage.