CIS 522

Final Project

2/11/2020

1 CIS 522 Final Project Overview

Deep Learning has revolutionized the way the world operates today, from allowing us to perform real time object detection to assisting in medical diagnostics, surpassing human ability in some areas. As such, there's no better way to get a sense of what it's like to be a data scientist in the real world than to employ the skills you've learned in this class to a real-world, data-drive problem that excites you. You will work in a team of 3 to 4 students, and together will come up with a project, implementation, report, and succinct video describing your findings. The last time we offered this course, the students enjoyed the final project and found it rewarding – we hope that you will as well.

Learning Goals:

1. Carefully survey literature and applications to find an application that would benefit from deep learning or a knowledge gap that can be filled by using deep learning.
2. Create a short writeup to pitch your idea to others in the field (the TAs, in this case).
3. As a group, outline a detailed plan for how you will implement your idea. Plan the dataset you will use, the best modeling approach, the compute you will need, etc. Come up with milestones to achieve the project.
4. Obtain and explore the dataset.
5. Implement the model architecture that you think will do well on this problem and data.
6. Debug, refine, and improve your model.
7. Create insightful and engaging visualizations to summarize your findings.
8. Create a written report of your findings.
9. Create a video summary of your project.
10. Present your project to your classmates and other students.

2 Project Timeline

Deliverable	Assigned Date	Due Date
Project Abstract Proposal	2/11/20	2/18/20
Project Proposal / Team Formation	2/21/20	2/28/20
Milestone 1	2/28/20	3/20/20
Milestone 2	3/20/20	4/10/20
Milestone 3 + Code Submission	4/10/20	4/24/20
Poster Presentation + Paper Presentation	4/24/20	4/28/20

Above is the timeline for the final project. Each of the components of the final project is described in more detail in the sections below.

3 Project Abstract Proposal

Description: Your first deliverable will be a short (300 word maximum) abstract on the project idea you would like to work on for the course. To come up with a project idea, we would like you to survey existing applications and literature in a domain of interest to you (i.e. Natural Language Processing, Reinforcement Learning, Computer Vision, Theoretical Deep Learning), find a potential application or knowledge gap you'd like to work on, and create a 300 word (max) pitch in the form of an abstract to convince others as to why this would be a cool project (in this case, you will be convincing the TAs). **This is an individual deliverable i.e. every student must submit an abstract.**

Requirements: Your abstract must contain mention of each of the following components

1. Motivation for the broader question (i.e. why care about this topic)?
2. What is already known or done in this domain?
3. What needs to be done differently? (i.e. knowledge gap or problem statement)
4. What modeling approach will your project use to address this gap/problem?
5. What would be the expected outcome of your project (i.e. tying it all back to the original knowledge gap, problem statement, and motivation)
6. Cite 3 related papers or models that are key for background reading

Proposal Rankings: The TA staff will go through all of the project abstract proposals and rank them on a variety of metrics (including how feasible the project is, how interesting the project is, etc.) and curate a list of **35** projects and release this list on Piazza. By the next milestone, you will look at these projects, and form a team amongst yourselves (with the person who submitted the proposal being on the team by default). **Note:** Whether or not your project is selected **will not** affect your proposal grade provided your abstract proposal meets all the requirements above.

4 Project Proposal + Team Formation

First, you must join/create a team of 3-4 other CIS 522 students, from one of the 40 curated projects that the TA team has selected. Once you've created your team, your team will deliver a more in-depth version of the previously submitted abstract. It's fine if things have changed since the original abstract, especially with regards to the method! The spirit of the idea must be similar, however.

Requirements: This proposal must contain the following elements

1. All the team members' names (3-4 students per group)
2. A description of the dataset being used (where it's from or how it will be made) as well as a sample of the data (i.e. 5 rows of the dataset if it's in a dataframe-like format or an appropriate visualization of 5 samples from the dataset)
3. A description of your hypothesis (i.e. what do you expect to happen?)
4. A description of your inductive biases (i.e. what is your rationale / intuition for why you think your hypothesis is true)
5. A related works section detailing papers relevant to your project as well as their findings / relevance to your project idea.
6. An in depth description of your expected implementation / model (**note:** it is completely fine if this does not end up being your final model, we expect that things will change throughout the course of the project)
7. A timeline up until the project report deadline (final deadline is Tuesday, April 28th 2020) with three distinct milestone deliverables that a TA can follow up on. Your milestones should be specific to your project and realistic. The milestone meetings with a TA must be scheduled before the following dates:
   (a) First milestone meeting by March 20th
   (b) Second milestone meeting by April 10th
   (c) Third milestone meeting by April 24th (you will submit your code at this date!)

5 Final Project Submission + Requirements

We will be releasing more details about this after you have formed groups and submitted a proposal! For now focus on coming up with a really cool idea! :)