

# STA414 Assignment A4 - 9% of Final Grade

Due: March 31th, 23:59 on Crowdmark

The goal of this assignment is to practice researching different machine learning domains. Whether you are writing a formal literature review in academia, or trying to implement a new technique in industry, reviewing papers, blogs and videos is a useful exercise. In this assignment, you will build this skill in a more structured environment. The use of LLMs is permitted, but reading each paper will greatly deepen your understanding. Please include any collaboration you have done, with LLMs or your peers.

## 1 Part One: Relevant Course Papers (20 marks)

Based on the topics we've learned in this course, pick an area of interest, and read 5 papers that build on that area. Complete a table with the new ideas introduced in the paper and the results. Link the paper arxiv links within the table. Marks will be awarded per paper based on the relevance of the paper and a concise explanation of the paper's impact (2-3 sentences).

You should **only** look for papers in the conferences NeurIPS, ICML, ICLR, AISTATS, UAI. You may find google or semantic scholar helpful when searching for papers in an area.

### 1.1 Example Paper and explanation

Table 1: Five recent research papers

Paper Title	Description	Relevance to Course
Learning Transferable Visual Models From Natural Language	This paper introduces a model that efficiently combines text and image models to have excellent zero shot learning capability by using textual prompts and an image to predict the class of the image with little to no finetuning. The model creates the foundation for future multi modal learning and combines embeddings from a strong language model with a strong image encoder.	This paper connects concepts on language and image embeddings discussed in the course. Compares against BOW methods and uses contrastive learning.

## **2 Part Two: Table of hypotheses (20 marks)**

Based on the papers you have read, create 5 hypotheses (total) on what would improve the results of the said papers. This is an open-ended and creative exercise. If you are combining techniques from multiple papers, cite the papers in your description. These can be listed in a table similar to part 1.

Marks will be awarded per hypothesis and the justification of the hypothesis.

## **3 Part Three: Hypothesis verification and explanation (50 marks)**

Find a paper that investigates one of your 5 hypothesis. If no paper exists, find a close one. Create a 1-page walk-through report explaining the paper and how it relates to your hypothesis from part 2.

Below is a recommended way to structure your explanation:

- 1/8 page: Introduce the paper.
- 1/4 page: Explain of your hypothesis from background reading.
- 1/2 page: Explain key results of the paper.
- 1/8 page: Explain next steps you would take to go further into the paper.

Marks will be awarded based on finding a relevant paper and providing a clear explanation of its impact. You should turn in a single pdf file, created ideally using latex or another text editor.