

## POTENTIAL PROJECT IDEAS – COMP 4107 NEURAL NETWORKS

The following list of project ideas is not exhaustive; any project that solves a problem using neural networks may be chosen. Some of these project ideas may require a dataset; you are responsible for creating/procuring a dataset if necessary.

Note that it is recommended to do a project that has some novel aspect. Implementing a well-known solution to a well-known problem is not very interesting. For all of these ideas, consider a novel variant (e.g. change the target you are trying to predict, use a different dataset, pre-process the data differently, experiment with architectures, etc.).

### 1. Optical character recognition

Optical character recognition is the task of identifying written characters (i.e. letters and numbers) from an image. Consider developing a convolutional neural network to classify characters with variations such as text stylization, different backgrounds, or varying ink colours.

### 2. Audio signal classification

Audio signals can occur in nature (e.g. bird calls), be used in telecommunications (e.g. Morse code), and entertainment (e.g. music). Consider developing a recurrent neural network to classify different types of audio signals.

### 3. Video game playing agent

Many video games could be played automatically by an intelligent agent. Consider using deep reinforcement learning to train an agent to play a simple video game.

### 4. Sentiment analysis

Social media is a vast source of data that can be used to understand popular opinions toward a variety of topics or issues. Using attention-based methods, analyze the sentiments of social media posts about a specific topic.

### 5. Image classification

Over the past several years, image classification using convolutional neural networks has exploded in popularity. Consider developing a unique image classifier for an interesting task (e.g. face detection, facial emotion recognition, pet breed identification) using a convolutional neural network.

### 6. Medical image segmentation

Identifying structures in medical images is an important task in assisting physicians with diagnosis of disease. Consider implementing a convolutional neural network to segment a medical image.

### 7. Biophysiological signal classification

Biophysiological signals (e.g. electrocardiogram, electroencephalogram, blood pressure) provide important information about patient health. Consider developing a recurrent neural network to predict the severity of disease in a patient given their biophysiological signals.

You may consider using publicly available datasets. Here are some repositories that host publicly available datasets. You are responsible for ensuring the dataset you choose is of sufficient quality for your project.

UCI Machine Learning Repository (<http://archive.ics.uci.edu/ml/index.php>)

Kaggle (<https://www.kaggle.com/datasets>)

Nature Scientific Reports Dataset (<https://www.nature.com/sdata/policies/repositories>)

Papers with Code (<https://paperswithcode.com/datasets>)