IT8302 APPLIED MACHINE LEARNING

Practical 1
Introduction to AI and Machine Learning

What you will learn / do in this lab

1. *Explore AI concepts and applications*
2. *Explore Machine Learning concepts and applications*
3. *Explore Deep Learning concepts and applications*

TABLE OF CONTENTS

1. OVERVIEW

In this practical, we would be exploring the concept of AI, Machine Learning (ML) and Deep Learning (DL). We would be looking at some examples of applications that use AI, Machine Learning and Deep Learning.

INTRODUCTION

Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Artificial intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks.

WHY AI NOW?

There are several reasons for the rapid growth of AI in the recent years

- ***Data****: The incredible amounts of data being collected on a daily basis is fueling the development of AI to analyze, find patterns, and provide answers using the data. Facebook revealed that its system processes 2.5 billion pieces of content and 500+ terabytes of data each day (circa 2012).*
- ***Hardware****: AI requires large amounts of computations to make use of the BigData sources. The availability of large warehouse sized computer centers on demand through cloud computing technologies is enabling AI to tackle problems it could not before. GPU accelerated computing also provides hardware acceleration for the AI servers.*
- ***Algorithms****: Improvements in algorithms such as Deep Learning and Deep Reinforcement Learning is enabling AI to tackle problems previously thought unsolvable or improving the performance to a level that matches or even surpass human ability. In 2016, Google AlphaGo beat the best human champion at Go. In addition, open source libraries with these advanced algorithms are being released.*

2. ARTIFICIAL INTELLIGENCE (AI)

In this section we will try out some applications of AI that you can use with your browser (please use Chrome browser).

AI APPLICATIONS

Generative AI --- This person does not exist!

This is a generative AI tool that creates realistic images of human faces.

Use URL:

- *https://this-person-does-not-exist.com/en*
- *https://thispersonnotexist.org/*

Activity

- *Take 15 minutes to explore this app.*
- *Share your favorite generated faces.*
- *How can you possibly detect such fake images?*

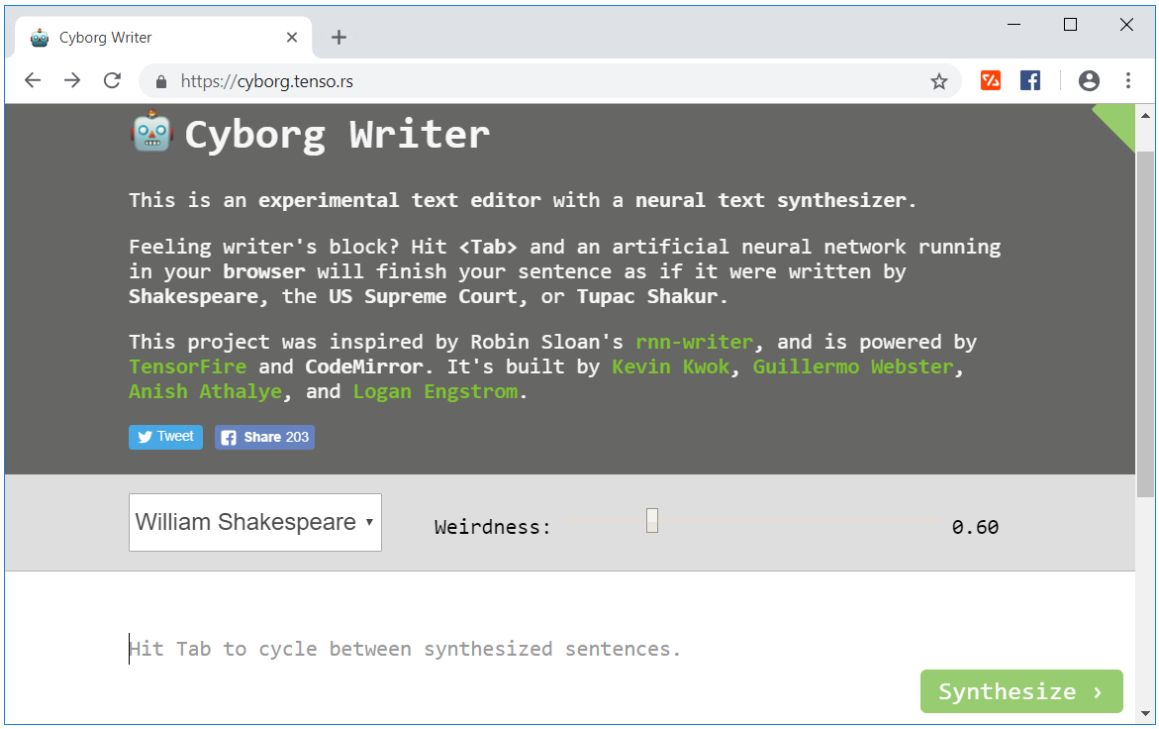
Cyborg Writer

It is an experimental text editor with a neural text synthesiser.

Use URL https://cyborg.tenso.rs/

For more information on how it works go to
https://www.robinsloan.com/notes/writing-with-the-machine/

Basically, it uses a type of deep learning network known as Recursive Neural Networks (RNN). The RNN has been pre-trained on examples of sentences by the authors of the different styles.



Activity

- *Take 15 minutes to explore this app.*
- *Try with a sentence starting with "Make Singapore ...."*
- *Share your favorite passage*

3. MACHINE LEARNING (ML)

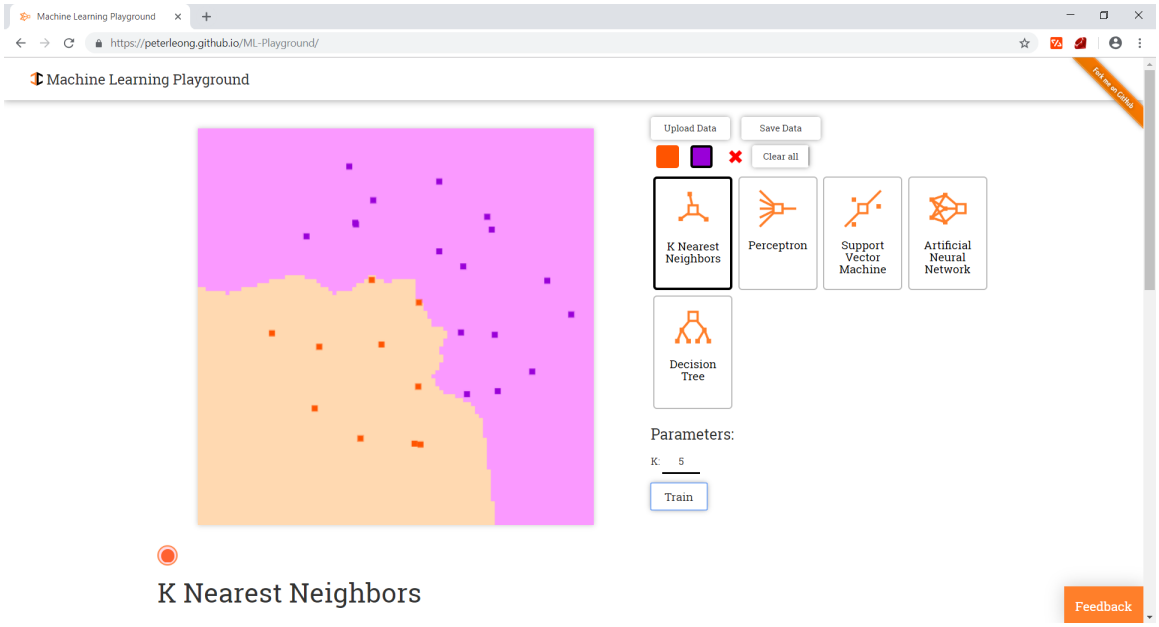
In this section we will explore a sub-area of AI called machine learning. Machine Learning (ML) is a field that explores algorithms enabling computer programs to improve their performance with time by learning from past experiences using data provided to it.

ONLINE DEMONSTRATIONS

Demonstrations of machine learning generating rules for generating decision boundaries that separate the different classes of data. Several different algorithms are shown:

- *Perceptron*
- *Artificial Neural Network (ANN)*
- *Support Vector Machine (SVM)*
- *K-Nearest Neighbors (KNN)*

Use URL https://peterleong.github.io/ML-Playground/

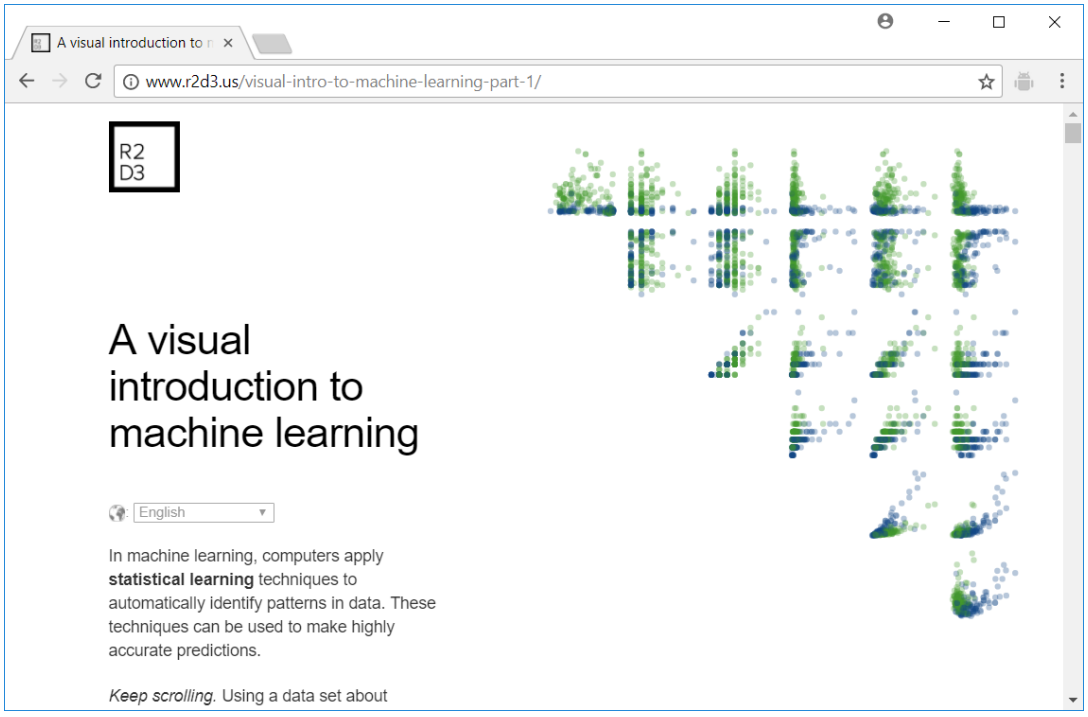


Activity

- *Take 20 minutes to explore this app.*
- *Which algorithm(s) work only with linearly separable data?*
- *What is different between Machine Learning algorithms and normal computer algorithms?*
- *Observe what happens when the data is unbalanced; when there are many more purple dots compared with orange dots. What are the implications of this on rare events?*

4. ADDITIONAL READING MATERIAL

Use URL http://www.r2d3.us/visual-intro-to-machine-learning-part-1/



Activity

- *Take 20 minutes to explore this app.*
- *What is name of the type of machine learning algorithm demonstrated?*