DEEP LEARNING USING PYTHON

BY JYOVITA CHRISTI

LECTURE 1

- History of AI
- The Deep Learning Revolution
- What is Deep Learning
- How Deep Learning is Transforming the World
- MNIST Dataset

HISTORY OF AI

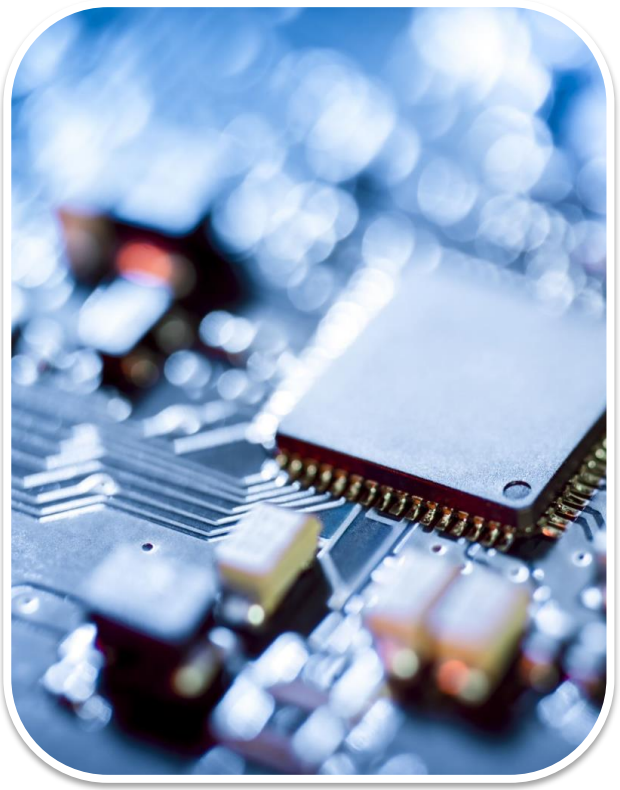
BEGINNING OF ARTIFICIAL INTELLIGENCE

COMPUTERS ARE MADE IN PART TO COMPLETE HUMAN TASKS

EARLY ON, GENERALIZED INTELLIGENCE LOOKED POSSIBLE

TURNED OUT TO BE HARDER THAN EXPECTED

EARLY NEURAL NETWORKS



- Inspired by biology
- Created in the 1950's
- Outclassed by Von Neumann Architecture

EXPERT SYSTEMS

Highly complex

Programmed by hundreds of engineers

Rigorous programming of many rules

EXPERT SYSTEMS - LIMITATIONS

What are these three images?

HOW DO CHILDREN LEARN?

- Expose them to lots of data
- Give them the “correct answer”
- They will pick up the important patterns on their own


THE DEEP LEARNING
REVOLUTION

DATA

- Networks need a lot of information to learn from
- The digital era and the internet has supplied that data

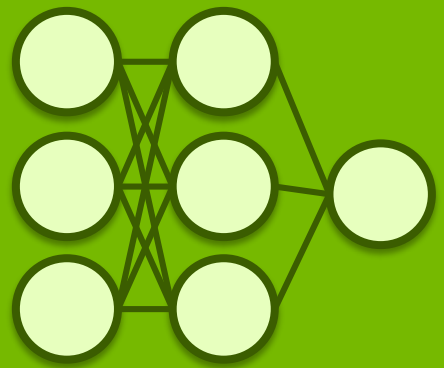
COMPUTING POWER

Need a way for our artificial “brain” to observe lots of data within a practical amount of time.

THE IMPORTANCE OF THE GPU

A Rendered Image

A Neural Network



WHAT IS DEEP LEARNING?

DEEP LEARNING FLIPS TRADITIONAL PROGRAMMING ON ITS HEAD

TRADITIONAL PROGRAMMING

Building a Classifier

1

Define a set of rules for classification

2

Program those rules into the computer

3

Feed it examples, and the program uses the rules to classify

MACHINE LEARNING

Building a Classifier

1

Show model the examples with the answer of how to classify

2

Model takes guesses, we tell it if it's right or not

3

Model learns to correctly categorize as it's training. The system learns the rules on its own

THIS IS A FUNDAMENTAL SHIFT

WHEN TO CHOOSE DEEP LEARNING

Classic Programming

If rules are clear and straightforward, often better to just program it

Deep Learning

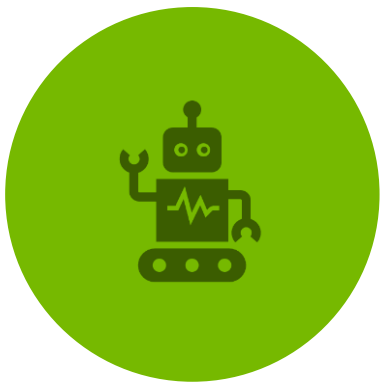
If rules are nuanced, complex, difficult to discern, use deep learning

DEEP LEARNING COMPARED TO OTHER AI

- Depth and complexity of networks
- Up to billions of parameters (and growing)
- Many layers in a model
- Important for learning complex rules

HOW DEEP LEARNING IS TRANSFORMING THE WORLD

COMPUTER VISION



ROBOTICS AND MANUFACTURING

OBJECT DETECTION

SELF DRIVING CARS

NATURAL LANGUAGE PROCESSING

REAL TIME TRANSLATION

VOICE RECOGNITION

VIRTUAL ASSISTANTS

RECOMMENDER SYSTEMS

CONTENT
CURATION

TARGETED
ADVERTISING

SHOPPING
RECOMMENDATIONS

REINFORCEMENT LEARNING

ALPHAGO BEATS WORLD CHAMPION IN GO

AI BOTS BEAT PROFESSIONAL VIDEOGAMERS

STOCK TRADING ROBOTS

OVERVIEW OF THE COURSE

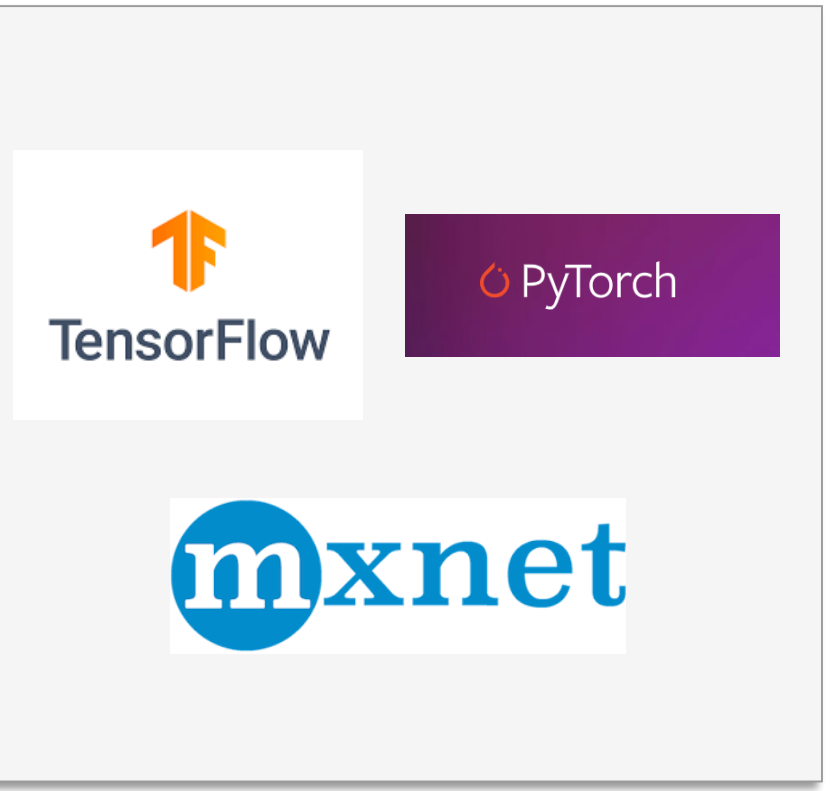
PLATFORM OF THE COURSE

GPU powered cloud server -Google Colab

Jupyter Notebook -Google Colab

SOFTWARE OF THE COURSE

- Major deep learning platforms:
  - TensorFlow + Keras (Google)
  - Pytorch (Facebook)
  - MXNet (Apache)
- We'll be using TensorFlow and Keras
- Good idea to gain exposure to others moving forward



FIRST PROGRAM:
CLASSIFY HANDWRITTEN DIGITS

https://colab.research.google.com/drive/1cnys-zjtcbrtv6m7iranbkusicmbc4vb?authuser=2#scrollto=l2ukbdzxoq7w