

ASSIGNMENT-1

By

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August 8, 2020

The rapid growth of technology facilitated growth of computation power and memory capacity. We owe the world wide web for accumulation of high volumes of data. This allowed us improve and automate the tasks that were repetitive and labor intensive using machine intelligence. The ability to make decisions based on learning from previous inputs, pattern recognition and predicting the outcomes is called machine learning. The optimization of correct predictions by reducing the error; lowering loss functions; using optimization algorithms for using correct parameters and avoid overfitting. The similar processes but when done in multiple deeper layers with linear and nonlinear processing units and using proper objective functions and improve learning rate by reducing loss is known as deep learning.

The foundation for every machine learning process is the Data. The model and algorithms are solely dependent on the dataset used. If the dataset has lot of errors and noise the result will also be poor. It is very important to preprocess the dataset before training it. Once the right data is prepared we can focus on modelling the data. The data must be split into test and train so that we can observe the effectiveness of our trained model. Better the results obtained on unseen data, better the accuracy of our model. To achieve this, we must also be cautious in picking the correct loss functions and optimization algorithms.

There are 3 types of ML algorithms:

1. Supervised Learning:

The training of model is done based on matching the inputs with correct outputs. In this learning, both x and y are known during training. It can be classified further into Regression and Classification. The basis of this classification is purely based on the output of problem statement:

- Classification (is it __ ?) Ex: Prediction of Apple and Orange
- Regression (How many __ ?) Ex: Prediction of Temperature

There are other similar techniques using supervised learning like Tagging, Search and Ranking, Recommender systems and Sequence Learning which are classified based on specific problem domains.

Tagging is more likely to be a multi label classification problem.

Search and ranking has more preference for order of the predicted outcome. Recommender System are similar to search and ranking and user behavior oriented.

Sequence learning is typically the variable number of inputs and outputs problem. Ex: Machine translation

2. Unsupervised Learning:

Training is done based features and recognizing the pattern for example clustering. Only x is known while training

3. Reinforcement Learning:

Learning is based on the actions taken by the agent on interacting with environment. On achieving the goal, the actions are rewarded. Ex: AlphaGo

The quest for growth in statistics and empirical data analysis has to be appreciated as these historical efforts have paved path to the modern computation power. The influence of Ronald Fisher, Alan Turing, Jacob Bernoulli, Carl Friedrich Gauss and others has impacted us greatly. The innovations like intelligent assistants, smart camera lens that can recognize objects, bots that can defeat world champions in complex board games truly inspired me to be passionate towards the field of Deep Learning.

Exercises

1. Which parts of code that you are currently writing could be “learned”, i.e., improved by learning and automatically determining design choices that are made in your code? Does your code include heuristic design choices?

Ans. The task of fetching appropriate results based on wide range of form selection can be reduced to few clicks as in recommender systems for example while shopping on ecommerce or picking good movies to watch on Netflix.

2. Which problems that you encounter have many examples for how to solve them, yet no specific way to automate them? These may be prime candidates for using deep learning.

Ans. File Management system without duplicate photos or videos. Work timecard Management clocking in the hours automatically. Smart restore of files accidentally deleted.

3. Viewing the development of artificial intelligence as a new industrial revolution, what is the relationship between algorithms and data? Is it similar to steam engines and coal (what is the fundamental difference)?

Ans. Well they are totally dependent on each other but not similar to steam engines and coal more like algorithms are System but data is the energy source that drives the system it can be like data is fuel and algorithms are car/ aeroplane etc.

4. Where else can you apply the end-to-end training approach? Physics? Engineering? Econometrics?

Ans. We can use it in any fields that produce data. We can use it in law, literature, arts, chemistry, biology etc.
AI in Finance is currently booming.
Detecting usable antivirals for treating covid-19. By analyzing its RNA structure.