BA885: Advanced Analytics II

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https://github.com/ndoroud/BA885_Spring_2022

Today we will...

1. ## Introduce the course
   - Who is this course tailored to?
   - Schedule, course materials and evaluation

2. ## Introduce the tools of the trade
   - Machine Learning tools (TensorFlow/Keras, Scikit-learn, Google Colab ...)
   - Big Data tools (Cloud computing, (Postgre)SQL, Docker, Airflow ...)

3. ## Review the fundamentals
   - Premise of Machine Learning
   - Statistics and Information Theory
   - Linear Algebra (The Tensor in TensorFlow!)
   - Neural Networks with TensorFlow/Keras

About me:

Grew up here!

Course Intro

- The course is tailored to future Data Analysts and Data Scientists.

- To take this course you need to be comfortable with Python and TensorFlow/Keras.

- The course schedule is available on the course github repository.
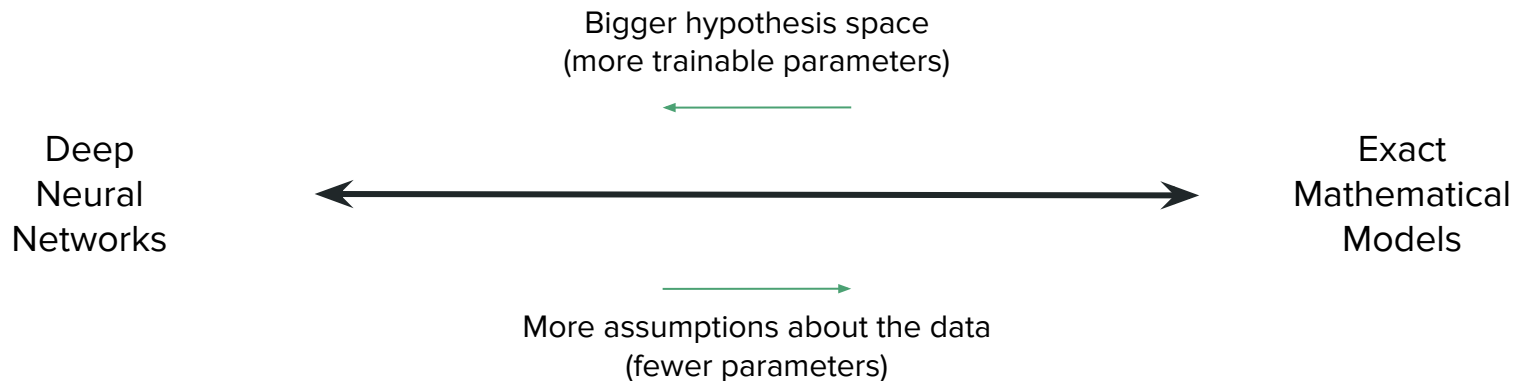
- The evaluation criteria are:
Attendance/Exercises 30%
Minor Assignments   30%
Major Assignments   40%

Tools of the Trade
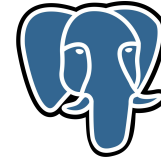
Fundamentals of Machine Learning

The premise of machine learning is to use data and computational power to compensate for our lack of understanding and inadequacy in modeling.

Bigger hypothesis space
(more trainable parameters)

Deep
Neural
Networks

Exact
Mathematical
Models

More assumptions about the data
(fewer parameters)

Statistics and Information theory

Understanding your data can enable you to build a model that is easier to train and has much better performance. You can gain a deeper understanding of your data by doing simple statistical analysis and utilizing information theory.

- How is your data distributed?

- How is the information you want to extract stored in your data?

- Which features carry what information?

Answering these questions can lead to a more adequate selection of features to feed to your model.

Linear Algebra

The underlying operations upon which you model is build and trained are tensor manipulations which falls under Linear Algebra.

- Are you familiar with tensors?

- Are you familiar with tensor operations?

Neural Networks and Deep Learning

Do you have a good grasp on the fundamental concepts of Neural Networks and Deep Learning listed below?

- Feed Forward

- Backpropagation

- Loss Function

- Stochastic Gradient Descent

- Underfitting and Overfitting

Questions?