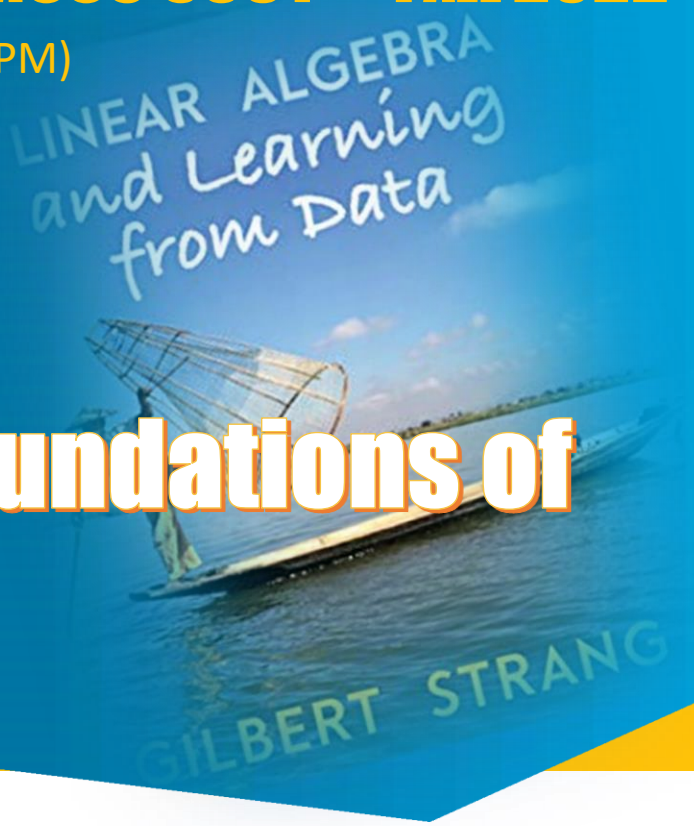
MARQUETTE UNIVERSITY

BE THE DIFFERENCE.

MATH 4931/MSSC 5931 – FALL 2022

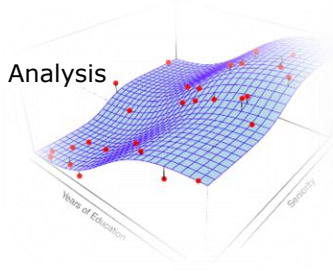
(TuTh 2:00PM - 3:15PM)

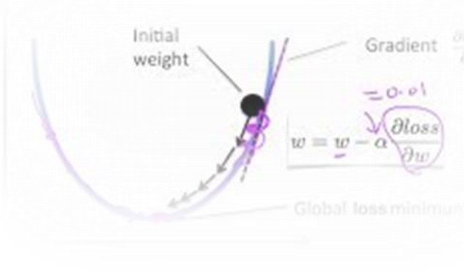


Mathematical Foundations of Data Science

Tentative topics :

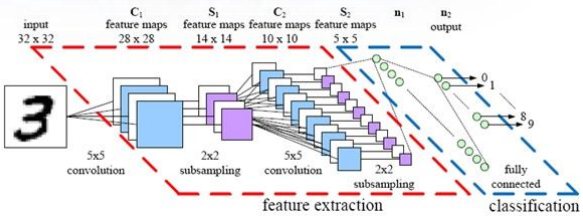
- **Computational and numerical methods** required for large data-sets and **Machine Learning**
- Some of those methods include
  - LU, QR, Spectral and Singular-Value Decompositions;
  - Conditioning and Stability
- **Basic Probability and Statistics**
- **Linear Regression**
  - Logistic Regression and Linear Discriminant Analysis
  - Ridge Regression and Lasso
- **Classification** with Support Vector Machine
- **Dimension Reduction and Clustering**
  - Principal Component Analysis (PCA)
  - Independent Component Analysis (ICA)
  - K-Means and Hierarchical Clustering
- **Neural Networks**
  - Mathematics of Neural Network and implementation using
    - PyTorch and fast.ai, *or*
    - TensorFlow and Keras
  - Optimization and Deep Learning
    - Convexity and Gradient-based approach
    - Minibatch Stochastic Gradient Descent
  - Fully Connected Network
  - Convolutional Neural Networks (CNN)
  - Modern Convolutional Neural Networks





Prerequisites:

- A course in Programming
- A course in Statistical Methods
- A course in Linear Algebra



For more information, email the instructor:

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