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Machine Learning Related Courses

- **Calculus I** at the University of Tehran
- **Calculus II** at the University of Tehran
- **Engineering Probability and Statistics** [Top mark - TA for 1 semester] at the University of Tehran
- **Statistical Inference** [audit] at the University of Tehran
- **Differential Equations** at the University of Tehran
- **Engineering Mathematics** at the University of Tehran
- **Numerical Computation** [optional] at the University of Tehran
- **Systems Analysis** (Signals and Systems) at the University of Tehran
- **Machine Learning** by Andrew Ng on Coursera
- **Neural Networks for Machine Learning** By Geoffery Hinton on Coursera
- **CS231n: Convolutional Neural Networks for Visual Recognition** by Fei-Fei Li from Stanford University
- **MIT 6.S094: Deep Learning for Self-Driving Cars** by Lex Fridman from MIT
- **Deep Learning** course on Udacity
- **Machine Learning** [audit] at the University of Tehran
- **Intelligent Systems** [audit] at the University of Tehran

Algorithm Related Courses

- **Graph Theory** [optional]
- **Graph Analytics for Big Data** by Amarnath Gupta on Coursera
- **Discrete Mathematics**
- **Data Structures and Algorithms** [Top mark]
- **Design and Analysis of Algorithms** [Top mark]
- **Automata and Language Theory** [Top mark]

The reason for so many audit and online courses is that at the University of Tehran students are not allowed to take more than a certain number of optional courses. Also, there wasn't any minor program besides software engineering (which is my major).

I have also recently started studying the following courses:

- **Linear Algebra** by Gilbert Strang from MIT
- **Analysis of Networks** by June Leskovec from Stanford
- **Convex Optimization** by Stephen Boyd from Stanford

Research Experiences

- **Internship at Fraunhofer IDMT**, Germany

- I spent the last year's summer studying convolutional neural networks as an intern at the **Fraunhofer Institute for Digital Media Technology**, and I implemented Jan Schlüter's paper, "**Learning to Pinpoint Singing Voice from Weakly Labeled Examples**". Analyzing the filters using saliency maps and inspired by the research in the music information retrieval and computer vision, I altered the network architecture, which led to achieving comparable accuracy with a lighter network and 1000 times fewer data.
- During the internship, I got experience with Keras, Theano, TensorFlow, and Pytorch. I Implemented the model in all the packages yet, I spent most of the time working with TensorFlow. One of the main programming challenges that I was able to overcome was that because my GPU was old it did not support the floating point precision that was required. I figured out this bug by monitoring the gradients of the network during the training phase and solved the problem by changing the optimization algorithm code to truncate (clip) the gradients.

- **Interpretable Medical Decision Support System**, Cognitive Systems Laboratory, University of Tehran

  - Bachelor's final project under the supervision of Professor **Majid Nili Ahmadabadi** on building a medical decision support system that leverages cognitive mechanisms such as attention to incorporate medical ontology to elevate the interpretability and reliability of the system.
  - This is an ongoing project and I will be using TensorFlow to get it done

- **Using Attention to Improve Aspect Based Sentiment Analysis**, Intelligent Information Systems Laboratory, University of Tehran

  - Working under the supervision of Professor **Azadeh Shakery** We are trying to apply the attention mechanism to capsule networks to improve aspect-based sentiment analysis
  - This is an ongoing project, the initial code base is in PyTorch

- **Research on CDR of Iran's Mobile Operators,** University of Tehran

  - Built graphs from CDR data and analyzed several graph characteristics
  - Found out about anomalies and the reasons behind them including the following
    - Spammers in the network trying to do mass advertising through text messages
    - Peak of the network usage just before certain holidays due to of the large volume of greetings
    - Irregularities in the pattern of text message traffic due to a popular TV show that had a soccer result prediction competition through text messages
  - worked under the supervision of Professor **Behnam Bahrak**
  - Got familiar with D3 / neo4j graph database / R / Python through the following course

- Other experiences mostly include course projects for the **related courses**