

Nan Zhang

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EDUCATION

Georgia Institute of Technology, Atlanta, GA 08/2018-05/2020

- M.S. in Computational Science and Engineering GPA: 3.66/4.0 (Good standing)
- **Graduate Teaching Assistant:** CS 4641/7641 (Machine Learning, Fall 2019), *Instructor: Mahdi Roozbahani*
CS 6250 (Computer Networks, Spring 2020), *Instructor: Maria Konte*
- **Selected Coursework:** Deep Learning, Data & Visual Analytics, Computational Data Analysis, Bayesian Statistics, Computational Science & Engineering Algorithms

Worcester Polytechnic Institute (WPI), Worcester, MA 08/2013-05/2017

- BSc. in Computer Science & Industrial Engineering (double major) GPA: 3.5/4.0 (Honors with Distinction)
- Dean's List (Fall 2013, Spring 2014, Fall 2014, Fall 2016)
- **Selected Coursework:** Database Systems, Artificial Intelligence, Linear Programming, Practical Optimization

RESEARCHES & PROJECTS

Domain Adaption in Videos, Instructor: Dhruv Batra 10/2019-01/2020

- Engineered Domain-Adversarial Training of Neural Networks (DANN) algorithm to apply domain adaptation for action recognition task with the source domain as UCF-101 and target domain as HMDB-51
- Implemented a pretrained ResNet-34 to extract spatial feature of RGB frames from each video in the source domain

Network Traffic Features Exploration to Detect Unwanted Traffic, Advisor: Maria Konte 08/2019-12/2019

- Investigated innovative machine learning-based DDoS attack detection and mitigation solutions (by building and comparing different models) that can be deployed at the core of the Internet, within Internet exchange points (IXPs)
- Evaluated the prediction threshold to minimize false positive rate or false negative rate
- Utilized graphs and visualizations to perform data analysis of the network traffic flows to improve prediction accuracy

Pneumonia Detection on Chest X-Rays Based on Deep Learning, Instructor: Duen Horng Chau 01/2019-05/2019

- Trained the Convolutional Neural Network (CNN) classifier using transfer learning with Alex Net (Accuracy: 97.13%)
- Visualized and interpreted the decision-making process of CNN by using Occluding, Saliency Map, Class Activation Map, t-SNE, Activations, and Weights (Conv 1)
- Downloaded Chest X-Ray Images dataset from Kaggle containing 1,324 normal images and 3,876 pneumonia images, divided the dataset into train/val/test with ratio 80%/10%/10%, and tuned all hyperparameters via grid-search
- Constructed an interactive web application that allows users to upload their X-ray images by utilizing HTML/CSS/AngularJS on the front-end and Flask on the back-end

Playing Atari with Deep Reinforcement Learning, Instructor: Dhruv Batra 10/2019-11/2019

- Constructed a deep convolutional Q-network on Pong-v0 (an Atari 2600 game from OpenAI Gym) for solving Markov Decision Processes (MDPs) and utilized the RGB images of the game screen as the observations for state
- Fine tuned the model to reach a positive evaluation average score within 5 million time steps

Image Captioning with LSTMs, Instructor: Dhruv Batra 10/2019

- Implemented and trained LSTM networks for image captioning task on Microsoft COCO dataset
- Fine tuned the model to achieve a BLEU score larger than 0.3 on the validation set

Variational Inference Implementation, Instructor: Negar Kiyavash 04/2019-05/2019

- Made Bayesian inference for parameters of Gaussian mixture model and evaluated the posterior distribution via Python

- Compared the computation results with self-implemented MCMC algorithm (via R) and visualized the difference in terms of efficiency and accuracy

BNP Paribas: Budget Automation, Major Qualifying Project, Advisor: Michael Ciaraldi

10/2016-04/2017

This is my undergraduate dissertation project, in which I worked with a business analyst to engineer an automated budgeting process for BNP's Global Markets IT Division and wrote the final paper (Grade: A).

- Constructed the SQL database in Microsoft SQL Server which covered 44 normalized tables pulled from project tools, mapping files and front users' inputs to capture all the business terms and logic
- Designed the Python server through the Flask framework and Pandas library
- Devised the front-end via AngularJS, HTML & CSS to address various application cases like file uploading and data editing
- Addressed the identified bottlenecks within the current process and lessened the complexity of the overall process, which could potentially save hundreds of man hours

Independent Research on PHP Site, Advisor: Vincent J. Manzo

08/2017-05/2019

- Developed a new Joomla platform based on an existing database for interactive media programming libraries which had over 9,000 registered members (<http://new.maxobjects.com>)
- Migrated data and created application features in PHP and MySQL, such as the expiration of users' post

Yelp-like Web Application

04/2017-11/2017

- Engineered a RESTful web application for different users to sign in and comment on local restaurants
- Architected the back-end in Node.js and MongoDB to capture data objects and achieve user authorization
- Used the Embedded JavaScript and Bootstrap to present views of different restaurants entered by the users

Object-oriented Analysis and Design, Instructor: Gary Pollice

01/2017-03/2017

- Programmed a game of Chinese Chess by using Test-Driven Development (TDD) in Java
- Applied different design patterns in Object Oriented programming and researched an overall 95% code coverage

Artificial Neural Network Implementation, Instructor: Neil Heffernan

08/2016-09/2016

- Implemented an artificial neural network (without using existing machine learning libraries) via NumPy
- Developed backpropagation algorithm to train the network and analyzed prediction accuracy under different percentage of training data and various number of hidden neurons

PROFESSIONAL EXPERIENCE

Software Development Intern, Fidelity Investments, Smithfield, RI

05/2016-08/2016

- Used Spring Framework to redesign a web application and created JUnit Test Cases for its Java utility classes
- Integrated Google Analytics into a web application and conducted data analysis under Agile methodology
- Updated department calendar in the database and wrote an automated program in Java to read files and generate queries
- Utilized the FitNesse testing tool to automate acceptance testing on existing software projects

PROFESSIONAL & LEADERSHIP SKILLS

- **Programming Language:** Python, Java, R, JavaScript, C, C++, HTML, CSS, PHP, Racket (Scheme)
- **Framework & Tools:** PyTorch, Node.js, AngularJS, Pandas, NumPy, Joomla, Spring MVC, Linux, Agile (Scrum)
- **Leadership:** *President*, WPI Chinese Student Association (02/2015-05/2016)