

Pooya Taherkhani

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Summary!

- Taught Mathematics and Computer Science in High School (CS Principles in Python, and CS A in Java).
- Taught SAT and ACT math preparation courses to high school students across Chicago area.
- Tutored students of all ages and knowledge levels for math in northern Chicago area.
- As a teaching assistant at Ohio University, supervised computer programming labs and tested and graded college students' programs written in C++ and C#.
- Three years of academic experience in data science, including analysis of large datasets, (using Python and R)
- Three years of academic experience in software development on Linux machines (using Python, C++, and C)
- Implemented machine learning algorithms from scratch and solved problems by utilizing suitable machine learning algorithms available in scikit-learn.
- Background in different disciplines, such as Industrial and Systems Engineering, Aerospace Engineering, economics, finance, and business
- Taught aircraft technical courses in the leading commercial airline of Iran; IranAir.
- Graduated from the leading science and engineering university in Iran; Sharif.

Education

Computer Science	Ohio University	Graduate-level Coursework (23 credit hours)	2015 – 2017
Industrial Eng.	Ohio University	Graduate-level Coursework (32 crd. hrs.) & Thesis	2012 – 2015
• Thesis: Robust statistical methods to mitigate the adverse effect of outliers in manufacturing cost estimation. Tool: R			
Flight Dynamics	Sharif University of Technology	Graduate-level Coursework (28 crd. hrs.) & Thesis	2004 – 2007
• Thesis: Modeling of nonlinear dynamics of a helicopter using recursive neural networks. Tool: MATLAB			
B.Sc. Aerospace Engineering	Sharif University of Technology		2000 – 2004
• Thesis: Industry foresight methods to predict the aerospace market trajectory with a focus on the market for remotely-piloted helicopters.			

Experience

Mathematics & Computer Science

- **Math & Computing Teacher** Loyola Academy (Chicago area) 2023 – 2025
 - Taught Advanced Placement Computer Science Principles (using Python) and Advanced Placement Computer Science A (in Java) to eleventh and twelfth graders.
 - Taught Algebra courses to Ninth graders.
- **Math Instructor** Mathnasium (Chicago area) Jan 2020 – March 2020
 - Tutored students of all ages and all skill levels for math.
 - Tutored high school students for Calculus, Statistics, Probability, and Geometry.
- **Math Instructor** (part-time) Academic Approach (Chicago area) Jan 2020 – March 2020
 - Taught math to high school students in Chicago area public, charter, and private schools to prepare for standardized tests for college admission, such as SAT and ACT.
- **Programming Lab Instructor** Ohio University Aug 2016 – May 2018
 - Supervised two C++ programming labs with a total of 30 students, helped students write their programs, Tested programming project submissions.
(courses: Introduction to Computer Science I & II).
 - Supervised two C# programming labs, one advanced and one introductory, each with 40 students for two terms. Helped students develop a website backed by a database to keep track of a warehouse inventory using C#, and SQL Server in ASP.NET framework.
(courses: Database Applications and Analytics, and Applications of Object Oriented Programming).

Aerospace

- **Aircraft Technical Instructor** IranAir Nov 2008 – Jul 2012
 - Taught courses (in English) to aircraft engineers and maintenance technicians on mechanical systems of large airliners.

Programming Projects

gitlab.com/pooyat

- **Border Analytics** (Nov 2019) gitlab.com/pooyat/border-analytics (Data Analysis, Software Engineering)
 - Analyzed data from U.S. border crossings records to merge similar records, sort records, and compute running monthly average for specific means of crossing and border.
 - Designed and implemented a scalable **object-oriented** program from scratch capable of processing an input table with over 350,000 rows within six seconds on a personal computer.
 - Tools: Python, bisection, unittest, csv
- **Purchase Analytics** (Apr 2019) gitlab.com/pooyat/purchase-analytics (Data Analysis, Software Engineering)
 - Analyzed a retail store (Instacart) consumer purchase data from two large related tables and generated a report table all by using Python standard data structures only.
 - Designed and implemented a **scalable** program from scratch capable of processing an input table with over 32,000,000 rows within 20 seconds on a personal computer.
 - Tools: Python, unittest, csv
- **Text Classifier** (Jun 2018) gitlab.com/pooyat/document-classifier (Machine Learning)
 - Determine if a given text document is related to a particular subject (in this case, *corporate acquisition*) using SVM and k -Nearest Neighbor algorithm (k -NN).
 - Applied different feature selection filters to pick the most significant features.
 - Tools: Python, NumPy, SciPy, scikit-learn, LIBSVM
- **Handwritten Digit Recognizer** (Jun 2018) gitlab.com/pooyat/digit-recognition (Machine Learning)
 - Recognized image of handwritten digits each represented by a numeric feature using kernel perceptron (98.38% accuracy) and SVM (97.77% accuracy).
 - Implemented perceptron algorithm with different **kernels** from scratch to classify linearly nonseparable data.
 - Tools: R, LIBSVM, Python, C++
- **Image Object Detector** (March 2018) gitlab.com/pooyat/bounding-box (Software Engineering, Multithreading)
 - Designed and implemented an **object-oriented multi-threaded** algorithm to identify objects in a binary image and draw minimum bounding boxes around them.
 - Achieved a speedup of 0.57 through multithreading for an image with a large number of objects.
 - Tools: pthread, C
- **Shortest Path Finder** (2017) gitlab.com/pooyat/shortest-distance (Software Engineering)
 - Implemented Dijkstra's shortest path algorithm **from scratch** which involved implementing a **heap** used as a priority queue. **Object-oriented Design**
 - Tools: C++, C++11
- **Sorting Algorithms Analysis** (2017) gitlab.com/pooyat/test-sorting-algorithms (Algorithms)
 - Implemented quicksort, Shellsort, and insertion sort algorithms and **measured their performance** in best, average, and worst case scenarios for up to **very large input** sequences. **Object-oriented Design**
 - Tools: C++, C++11
- **Predictive Estimator** (2016) gitlab.com/pooyat/predictive-estimator (Statistics, Machine Learning)
 - Derived and implemented a polynomial curve fitting model from scratch for a customized error measure with and without regularization to quell overfitting using matrix calculus.
 - Tools: R

Programming Languages and Technologies

Programming Languages:	Python, C++, C, Java, R.
Operating Systems:	Linux, Windows, macOS.
Software Development:	revision control (Git), Linux shell scripting (Bash), build automation (Make), text editing (vi & Vim), network login, transfer, & file system (ssh, scp, sshfs).
Data Analysis:	NumPy, SciPy.
Data Visualization:	ggplot2, Matplotlib.
Machine Learning Libraries:	scikit-learn, Interested in PyTorch (deep learning, reinforcement learning).
Generic Libraries:	C++ STL, Python unittest.

Programming Languages and Technologies (continuation)

Multithreading Libraries (HPC): pthread, Interested in Python multiprocessing.
Report generation: L^AT_EX, Emacs, org-mode, markdown, knitr.
Experience with: SQL Server, C#, .NET, Visual Studio.
Interested in HPC DevOps: Linux resource management (Slurm), containerized virtualization (Docker), container orchestration (Kubernetes), distributed file system (Lustre), configuration management (Ansible, Puppet), network protocols (sftp, https).

Publication

E. Ardjmand, G. Weckman, N. Park, **Pooya Taherkhani**, and M. Singh. "Applying genetic algorithm to a new location and routing model of hazardous materials." International Journal of Production Research 53, no. 3 (2015): 916-928.

Technical Writing Sample

- gitlab.com/pooyat/wholly-slope/-/blob/main/wholly_slope.pdf
A mathematical proof of the fact that the slope of a secant line between any two integer points on the graph of a univariate polynomial function with integer coefficients is always an integer.
- gitlab.com/pooyat/queens/-/blob/main/n_queens.pdf
An iterative solution to the n queens problem in pseudocode as well as code in C and Python.
- gitlab.com/pooyat/bounding-box/blob/master/REPORT.pdf
Design and implementation of an object-oriented multi-threaded algorithm to identify objects in a binary image by drawing minimum bounding boxes around them.
- gitlab.com/pooyat/predictive-estimator/blob/master/REPORT.pdf
Derivation and implementation of a vectorized closed-form solution for a polynomial curve fitting model with a modified error measure using matrix calculus.
- gitlab.com/pooyat/test-sorting-algorithms/blob/master/REPORT.pdf
Analysis, implementation, and measurement of performance of different sorting algorithms, such as quicksort, Shell-sort, and insertion sort in different scenarios for up to very large input sequences.
- gitlab.com/pooyat/document-classifier/blob/master/REPORT.pdf
Mathematical proofs on the use of kernel techniques in different machine learning algorithms, such as nearest neighbors, max-margin hyperplanes, and perceptron.

Selected Coursework

- **Computer Science (Ohio University):**

Discrete Mathematics	Operating Systems
Data Structures (C++)	Artificial Intelligence
Design and Analysis of Algorithms	Natural Language Processing
Computation Theory	
- **Industrial and Systems Engineering (Ohio University):**

Statistics	Supply Chain Management (mathematical modeling)
Designed Experiments	Managerial Economics
Operations Research (mathematical optimization)	Corporate Finance
Discrete-event Simulation	Computer Enterprise Systems (SAP)
- **Flight Dynamics and Control (Sharif University of Technology):**

Differential Equations	Optimal Control (calculus of variations)
Partial Differential Equations	Neural Networks
Advanced Automatic Control	Engineering Design Concepts
Control Systems Design	Strategic Management
- **Aerospace Engineering (Sharif University of Technology):**

Fluid Mechanics	Airplane Structural Analysis
Aerodynamics I & II	Airplane Structural Design
Aerodynamics of Helicopter	Automatic Control
Heat Transfer	Airplane Performance
Propulsion	Airplane Design