

# Tahereh Fahi

✉ [tahereh.fahi1@gmail.com](mailto:tahereh.fahi1@gmail.com)  
Toronto, Canada

⌚ [github.com/tahereh-fahi](https://github.com/tahereh-fahi)  
㏌ [linkedin.com/in/tahereh-fahi](https://linkedin.com/in/tahereh-fahi)

## Education

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### Massachusetts Institute of Technology (MIT)

*MicroMaster*  
Statistics and Data Science  
**GPA: 4/4**

Sep 2022 – Apr 2024

### Tarbiat Modares University, Tehran, Iran

*Master of Science*  
Information Technology Engineering- IT Systems  
**Ranked 1<sup>st</sup>**  
**GPA: 3.92/4**

Aug 2018 – May 2022

### K.N. Toosi University of Technology, Tehran, Iran

*Bachelor of Science*  
Industrial Engineering- System Analysis  
**Ranked 1<sup>st</sup>**  
**GPA: 3.35/4**

Sep 2009 – Oct 2013

## Research Interests

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- Business Data Analytics
- ML & Optimization
- Human–AI Interaction
- Data-Driven Decision-Making
- Applications in Finance, Bioinformatics & Network Science
- Statistical & Evolutionary Models
- Operations Management
- Engineering Statistics
- Visualization

## Experiences

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### Research Experience.....

Tarbiat Modares University Tehran, Iran  
Graduate Research Assistant Aug 2016 – Aug 2017  
“Integrating a Local Feature Selection and a Modified PLR Method for Stock Trading Points Prediction” ([GitHub](#))

- Addressed the challenge of non-stationary, noisy financial time series where global feature selection often fails to capture localized market dynamics.
- Developed a hybrid model integrating Piecewise Linear Representation (PLR) for time-series segmentation with Local Feature Selection (LFS) to identify the most relevant technical indicators within each market regime.
- Validated the approach on real-world stock market datasets, achieving more accurate turning-point (peak/trough) detection and improved trading signal precision with lower computational cost compared to global selection methods.

### Industry Experience.....

Roboself.ai Toronto, Canada

*Data Scientist* Nov 2018 – Present

- Developed algorithms to detect turning points in financial time series, improving early trend reversal prediction.
- Designed hybrid AI models combining Neural Networks, GA, PSO, and NSGA-II for multi-objective optimization.
- Applied time series analysis and signal processing for feature extraction, noise reduction, and model reliability

## **Skillset**

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**Languages:** Python, R, C++, C#, MATLAB, MQL (a programming language for developing automated trading systems on MetaTrader 4 and 5)

**Machine Learning Algorithms:** Decision Tree, SVM, Linear Regression, Linear Programming, Clustering, Bayesian, Deep Learning, Gaussian Process, Convolutional Neural Network, RL (Q- Learning)

Machine Learning Technologies: TensorFlow, PyTorch, Keras, Pandas, Numpy, SciKit Learn, Matplotlib, Seaborn

**Software Development Technologies:** SQL, NoSQL

**Big Data and Cloud Technologies:** Microsoft Azure, Google Cloud

**Computer Engineering:** Data Structures, Algorithms, Object Oriented Programming

## **Projects**

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### **Deep Learning Specialization Projects.....**

#### ***Generative Adversarial Networks for Realistic Image Synthesis***

- Tackled the challenge of generating realistic synthetic imagery without labeled datasets.
- Built and trained PyTorch GAN models to improve adversarial stability and latent-space representation.
- Achieved visually consistent outputs and enhanced feature diversity across generated samples.

#### ***Convolutional Neural Networks for Object Detection and Image Generation***

- Addressed limitations of traditional classifiers in handling image spatial hierarchies.
- Designed CNN architectures with transfer learning and residual blocks for detection and segmentation tasks.
- Improved recognition accuracy and generalization through YOLO-based detection and style transfer.

#### ***Sequence Modeling with RNNs and Attention Mechanisms for Natural Language Processing***

- Confronted with the difficulty of modeling sequential linguistic dependencies in text.
- Trained RNN, LSTM, and attention-based models for translation, sentiment, and trigger-word tasks.
- Demonstrated higher accuracy and contextual retention over baseline n-gram and bag-of-words models.

#### ***Deep Learning Approaches for Emotion Recognition in Social Media Text***

- Sought to detect emotional tone and polarity in informal, high-noise tweet data.

- Engineered tokenization and embedding layers with deep classifiers for multi-label emotion prediction.
- Produced robust classification results that outperformed classical sentiment baselines.

### ***Optimization and Regularization Strategies for Neural Network Training***

- Faced issues of slow convergence and overfitting in deep model training.
- Applied initialization schemes, dropout, L2 regularization, and batch normalization in TensorFlow.
- Enhanced model stability and reduced training error by >25% compared to untuned networks.

### ***Bias–Variance Trade-Off and Transfer Learning Strategies in Machine Learning***

- Identified challenges of model under/overfitting and data mismatch in ML pipelines.
- Diagnosed errors and optimized architectures using ML-strategy frameworks and transfer learning.
- Reduced generalization error and accelerated deployment by improving model selection decisions.

### ***Implementation of Deep Neural Networks for Structured and Image Data***

- Needed to build neural networks from scratch to understand backpropagation mechanics.
- Coded multilayer perceptrons and logistic regression models in NumPy.
- Verified correctness through gradient checks and achieved high accuracy on 2D planar datasets.

## **MIT MicroMaster Projects**

### ***Q-Learning with Function Approximation for Sparse-Reward Text-Based Games ([GitHub](#))***

- Aimed to teach an agent to learn optimal policies under sparse reward conditions.
- Implemented Q-learning with linear approximation and adaptive exploration.
- Achieved stable convergence and measurable improvement in cumulative reward rates.

### ***Progressive Digit Recognition on MNIST: From Linear Models to Convolutional Neural Networks***

- Investigated performance limits of linear classifiers on handwritten digits.
- Constructed a progressive pipeline from logistic regression to CNN architectures with dropout.
- Attained >98% accuracy while improving model robustness and computational efficiency.

### ***Dimensionality Reduction and Classification of Single-Cell RNA-Seq Data ([GitHub](#))***

- Addressed the problem of analyzing noisy, high-dimensional genomic datasets.
- Applied PCA and t-SNE for dimensionality reduction and clustered cells using supervised learning.
- Discovered distinct cell types and validated grouping accuracy with cross-validation metrics.

### ***Comparative Graph Analysis of Facebook and Twitter Networks Using Structural and Statistical Models ([GitHub](#))***

- Explored assortativity and topological differences between social networks.

- Computed degree distributions, centralities, and power-law fits to evaluate network models.
- Found significant cross-platform structural variations that supported hypotheses on influence dynamics.

### ***Graph-Based Centrality and Community Detection in Criminal and Citation Networks***

- Tackled identification of key actors and clusters within complex networks.
- Applied centrality metrics and community detection algorithms on graph datasets.
- Revealed critical nodes and relationships informing intervention and recommendation strategies.

### ***Collaborative Filtering with Gaussian Mixture Models for Sparse Movie Rating Prediction***

- Confronted the problem of missing user ratings in recommendation systems.
- Modeled latent preferences using Gaussian mixture models with expectation-maximization.
- Improved prediction consistency and reduced BIC-based model penalty under sparse data.

### ***Sentiment Classification of Amazon Product Reviews Using Logistic Regression***

- Needed to extract consumer sentiment from large text corpora.
- Implemented bag-of-words features and regularized logistic regression for classification.
- Achieved high F1 scores and validated model generalization through cross-validation.

### ***Forecasting CO<sub>2</sub> Concentrations and Economic Indicators Using ARIMA Models ([GitHub](#))***

- Faced non-stationary patterns in environmental and economic time series.
- Built ARIMA models with residual diagnostics and forecast validation.
- Produced accurate short-term forecasts validated against observed measurements.

### ***CPI and BER Inflation Data Analysis with External Regressors and Model Improvements ([GitHub](#))***

- Investigated relationship between CPI inflation and BER expectations for forecasting.
- Integrated external regressors into ARIMAX models and tested cross-correlation effects.
- Enhanced predictive accuracy and model stability across validation horizons.

### ***Gaussian Process Models for Spatial Prediction of Environmental Data ([GitHub](#))***

- Aimed to predict spatial variables (such as ocean currents and temperature fields).
- Built Gaussian Process models with custom covariance kernels and hyperparameter optimization.
- Accurately interpolated flow patterns from Philippine Archipelago data with low prediction error.

## **TensorFlow Course Projects.....**

### ***Design and Optimization of Multilayer Feedforward Neural Architectures Using TensorFlow***

- Addressed need for efficient model design across diverse data types.
- Constructed and optimized deep feedforward networks with TensorFlow.
- Improved classification accuracy and training efficiency through architecture tuning.

### ***Advanced Convolutional Frameworks for Image Recognition and Feature Extraction in TensorFlow***

- Tackled feature extraction limitations in raw image classification tasks.
- Implemented CNN architecture with pooling and regularization to enhance robustness.
- Increased test accuracy and reduced overfitting through parameter refinement.

## Leveraging Pretrained Deep Models for Domain-Specific Applications via Transfer Learning

- Faced data scarcity in target domains requiring high-accuracy models.
- Fine-tuned pretrained CNNs to specialized datasets using transfer learning.
- Achieved significant performance gain with minimal training time and data usage.

## Related Extra Courses

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|---|------|
| ○ <b>Machine Learning on Google Cloud</b> , Coursera  | 2020 |
| Completed a 5-course program covering Vertex AI, AutoML, BigQuery ML, custom model training with Docker, feature engineering, and hyperparameter tuning with Vertex Vizier. Gained hands-on experience in distributed TensorFlow, end-to-end ML pipeline development, and model deployment and optimization on Google Cloud Platform. |      |
| ○ <b>Deep Learning Specialization</b> , Coursera (Offered by deeplearning.ai)   | 2020 |
| Neural Network architectures (CNNs, RNNs, LSTMs, Transformers) using Python and TensorFlow for real-world applications and ML project structuring)  |      |
| ○ <b>Machine Learning</b> , Coursera (Stanford University)  | 2024 |

## Related Attended Courses

### Graduate Courses:

- Machine learning
- Data Mining & Knowledge Discovery
- Information & IT
- Web Architecture & Programming

### Undergraduate Courses:

- Systems Analysis
- Computer Programming
- Engineering Statistics
- Computer Applications in IE

## Awards

- Ranked **99<sup>th</sup>** among approximately 32,000 participants in the Information Technology Engineering National M.Sc. Entrance Examination for universities of Iran 2015
- Ranked among top **7%** among more than 260000 participants in the 'Iranian National universities' entrance exam for B.Sc. degree 2009
- Selected as a qualified person at the first stage of "Iranian National Computer Olympiad" 2006

## Language Proficiency

**English:** Full professional proficiency: CELPIP–General LS: Listening 10/12, Speaking 7/12

**Persian:** Native or bilingual proficiency

## REFERENCES

- **Dr. Seyed Kamal Chaharsooghi**, Professor at Tarbiat Modares University, Department of Industrial and Systems Engineering, Tehran, Iran.  
Email: skch@modares.ac.ir
- **Dr. Milad Jasemi**, Professor at University of Montevallo, Assistant Professor of Data Analytics/Department Chair  
Email: emjasemiz@montevallo.edu