

# Abolfazl SAGHAFI

Statistician | Assistant Professor | Director of Data Science Program at USciences

 [linkedin.com/in/abolfazl-saghafi-438b6841](https://www.linkedin.com/in/abolfazl-saghafi-438b6841)

 2one5-59SIX-7two4zero     [asaghafi\[AT\]mail.usf\[DOT\]edu](mailto:asaghafi@mail.usf.edu)

 University of the Sciences, Philadelphia, PA, 19104

  [AbolfazlSaghafi.info](http://AbolfazlSaghafi.info)

Patterns and forms surround us, and I enjoy discovering them using the language of statistics. Proven with publications in a variety of fields, I solve real-life problems. I am currently an Assistant Professor of Statistics and Data Science at University of Sciences in Philadelphia. My research revolves around Machine Learning, Deep Learning, BIG Data, and Classification of Non-Stationary Signals.

## COMPETENCIES

---

**Research**    BIG Data, Machine Learning, Deep Learning, Time Series Classification, High Dimensional Data, Parametric/Non-Parametric/Bayesian Analysis and Modeling, Extreme Value Probability Distributions

**Programming**    R, Python, MATLAB, SAS, Weka, Tableau, KNIME, TensorFlow, Apache Hadoop, Spark, WinBUGS, MINITAB, Weibull++, SPSS, DERIVE, EEGLAB, BCILAB

**Certificates**    **Machine Learning** by Stanford University, Coursera June 2015. **Introduction to Big Data** by UC San Diego, Coursera May 2016. **Hadoop Platform and Application Framework** by UC San Diego, Coursera June 2016. **Machine Learning With Big Data** by UC San Diego, Coursera June 2016. **Interview Research and Preparation** by University of Maryland, Coursera July 2016. **Data Management and Visualization** by Wesleyan University, Coursera June 2017. **TensorFlow in Practice Specialization** by DeepLearning.AI, Coursera January 2020. **Data Visualization with Tableau Specialization** by UC Davis, Coursera October 2021.

## EDUCATION

---

**PH.D. IN STATISTICS** 2014 - 2017

University of South Florida, Tampa, FL, USA.

Dissertation : Real-time Classification of Biomedical Signals, Parkinson's Analytical Model

Major Professor : Distinguished Professor Dr. Chris P. Tsokos

**PH.D. IN APPLIED MATHEMATICS** 2007 - 2012

Iran University of Science and Technology, Tehran, Iran.

Dissertation : Modeling Fracture Strength of Ceramic Tiles using Entropy

Major Professor : Dr. Gholamhossein Yari    Advisor : Dr. Alireza Mirhabibi

**M.SC. IN MATHEMATICAL STATISTICS** 2004 - 2007

Shahid Beheshti University, Tehran, Iran.

Thesis : Application of Bernoulli Sequences in Watermarking

Supervisor : Dr. Hamideh D. Hamedani

**B.SC. IN STATISTICS** 2000 - 2004

Azad University, Tehran, Iran.

Project : Simulation, Markov Chains Monte Carlo methods and Gibbs Sampler

Supervisor : Dr. Hamid Pezeshk

## PROFESSIONAL EXPERIENCE

---

- Present** | **Assistant Professor of Statistics, UNIVERSITY OF SCIENCES IN PHILADELPHIA, PA, USA**  
**Aug 2017**
- › Taught courses including Biostatistics, Probability, Machine Learning, Regression Analysis, Time Series, Data Visualization
  - › Developed courses for online delivery for all of the courses that I have taught; courses that required coding utilize R, Python, or SAS
  - › Collaboratively developed a BS program in Data Science at USciences
  - › Committee member of Data Science program, Director since Jun 2020
  - › Joint research projects on multiple subjects including sophisticated patented underground object detection techniques, mRNA sequence reading and classification using Deep Learning methods
  - › Supervised funded student research on two Machine Learning projects
  - › Supervised at least 4 student research projects that presented at a USciences Research Day
- Two granted patents | Six peer-reviewed publications | Six online courses  
University and department Service | Undergraduate research
- Jun 2017** | **Graduate Teaching Associate, UNIVERSITY OF SOUTH FLORIDA, FL, USA**  
**Jan 2015**
- › Conducted state-of-the-art research on EEG signals and eye-state prediction
  - › Taught GenEd courses to large class of students, more than 150 students
  - › Developed a heredity model for Parkinson's disease
  - › Developed a model for eye-state identification using brain signals
- One Patent under review | Real-time eye-state identification | Parkinson's model of heredity  
Introductory Statistics 1 | Intro to Probability
- Jun 2014** | **Invited Lecturer, PAYAM NOOR UNIVERSITY, Tehran, Iran**  
**Sep 2011**
- › Taught Statistics major courses, listed below
  - › Directed undergraduate research
- Probability and Statistics 1 | Probability and Statistics 2 | Time Series | Stochastic Processes  
Design of Experiments | Computational Statistics | Statistical Methods | Bachelor's Project
- Aug 2011** | **Visiting Research Scholar, UNIVERSITY OF PATRAS, Patras, Greece**  
**Feb 2011**
- › Worked on distributions of order  $k$  with Dr. Andreas Philippou which led to publishing a conjecture regarding an open problem since 1983. We partially solved the conjecture in 2012, partially solving a 29 years old open problem
- Research partially funded by Iran Ministry of Science Research and Technology
- Jun 2014** | **Lecturer, IRAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, Tehran, Iran**  
**Sep 2008**
- › Taught GenEd Stat, Math, and Applied Math courses, listed below
  - › Consulted graduate and undergraduate students in their research
  - › Defense committee member of at least 6 PhD and Master students
  - › Editor of the 11th Iranian Statistical Conference, published conference proceedings using  $\text{\LaTeX}$  &  $\text{\TeX}$
  - › Executive Manager of the 13th Student Statistical Competition at ISC11
- Probability and Statistics for Engineers | Applied Math & Stat for Architecture Students  
Applied Mathematics 1 | Applied Mathematics 2 | Statistical Methods | Stochastic Processes  
Time Series
- Jan 2010** | **Invited Lecturer, AZAD UNIVERSITY, Karaj, Iran**  
**Jan 2008**
- › Taught GenEd Math courses, listed below
- Calculus 1 | Calculus 2 | Applied Mathematics | Probability and Statistics for Engineers

Sep 2007 | Research Assistant, SHAHID BEHESHTI UNIVERSITY, Tehran, Iran

Sep 2006

- > Research Assistant of Dr. M. Reza Meshkani
- > Performed complex computations and simulations on various research articles

## TEACHING

---

### UNIVERSITY OF THE SCIENCES IN PHILADELPHIA, PA, USA.

08.2017 - PRESENT

#### Assistant Professor of Statistics & Data Science

ST 310 - Biostatistics I (Fa17, Sp-Fa18, Sp-Fa19, Sp20-Fa20, Sp-Fa21)

ST 320 - Intro to Probability (Sp18, Sp20, Sp21)

DS 403 - Applied Machine Learning (Fa18, Sp20, Fa20, Fa21)

ST 720 - Regression Analysis with SAS (Sp19)

DS 401 - Time Series and Forecasting (Sp21)

DS 301 - Data Visualization (Fa21)

DS 202 - Intro to Data Science II (3-weeks) (Sp21)

DS 101 - Data Science Orientation (co-teach) (Fa20, Fa21)

All courses have been designed for online delivery

### UNIVERSITY OF SOUTH FLORIDA, TAMPA, FL, USA.

01.2015 - 06.2017

#### Graduate Teaching Associate (Instructor of Record)

STA 4442 - Introduction to Probability (Sp17)

STA 2023 - Introductory Statistics 1 (Sp16, Fa16)

150+ students in STA2023

### IRAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, TEHRAN, IRAN.

09.2008 - 06.2014

#### Lecturer

Probability and Statistics for Engineers (Fa09 - 13, Sp10, 11, 13, 14)

Mathematics and Statistics for Architecture Students (Fa10 - 13)

Applied Mathematics 2 (Fa10, 11, Sp13)

Applied Mathematics 1 (Sp11, 14)

Statistical Methods (Sp13, 14)

Stochastic Processes (Fa12, 13)

Time Series (Sp12)

### PAYAM NOOR UNIVERSITY, TEHRAN, IRAN.

09.2011 - 06.2014

#### Invited Lecturer

Probability and Statistics 1 (Fa12, Sp13)

Probability and Statistics 2 (Fa11, Sp12)

Time Series (Sp12, 13, Fa13)

Stochastic Processes (Fa11, 12, Sp14)

Design of Experiments (Sp14)

Computational Statistics (Summer 08)

Statistical Methods (Fa13)

Bachelor's Project (Fa-Sp11 - 13)

### AZAD UNIVERSITY, KARAJ, IRAN.

02.2008 - 01.2010

#### Invited Lecturer

Calculus 1 (Sp08, Sp09)

Calculus 2 (Fa-Sp09)

Applied Mathematics (Fa10)

Probability and Statistics for Engineers (Sp08, Fa09, Fa10)

**SYSTEMS AND METHODS FOR DETECTING BURIED OBJECTS**

US 10,677,914 B1

<http://pdfpiw.uspto.gov/>

A non-provisional patent granted by USPTO, granted on June 9, 2020. This is a continuation of our patent mentioned below with wider claims.

detecting rebar reinforcement in foundation construction    locating utilities    detecting caves    detecting graves  
detecting landmines and unexploded ordinance

**SYSTEMS AND METHODS FOR DETECTING BURIED OBJECTS**

US 10,175,350 B1

<http://pdfpiw.uspto.gov/>

A non-provisional patent granted by USPTO, granted on Jan 8, 2019. We developed state-of-the-art analytics to detect subsurface objects ahead using Ground Penetrating Radar (GPR) signals captured at discrete locations along a surface of a medium and estimated their location and depth in real-time with high accuracy. We are potentially looking for companies to invest in our technology.

detecting rebar reinforcement in foundation construction    locating utilities    detecting caves    detecting graves  
detecting landmines and unexploded ordinance

**MACHINE LEARNING ANALYTICS IN REAL TIME FOR HEALTH SERVICES**

US 16,161,975

<http://abolfazlsaghafi.info/research/>

A non-provisional patent is filed on October 16, 2018 with USPTO and is currently under review. We developed analytic systems with the ability to analyze time-series data in real-time. These analytics take the random nature of changes into account via a control process to speed up the prediction process and provide more accurate predictions.

real-time epileptic seizure prediction    decoding honey bee dance moves used for communicating location of food  
heart problem diagnosis

**CONFERENCE PROCEEDINGS**

- 9 A. Saghafi, S. Jazayeri, S. Esmaili, C.P. Tsokos, Real-time anomaly detection using Dynamic Time Warping of GPR signals, Proceeding of SEG19, San Antonio, Texas, 15-20 Sep 2019.
- 8 A.F. Kirkpatrick, A. Saghafi, J. Alexander, E. Bavry, T. Hanson, R. Schwartzman, Optimal Dose Of Intravenous Ketamine To Treat Complex Regional Pain Syndrome, Anesthesiology, 13-17 Oct 2018.
- 7 A. Saghafi, S. Jazayeri, S. Esmaili, C.P. Tsokos, Real-time and Automatic Underground Object Detection by using Ground Penetrating Radar Signals . Frontiers of Statistics Annual Conference on Data Sciences across Disciplines, 11-12 May 2018.
- 6 A. Saghafi, C.P. Tsokos, R.D. Wooten, On Heredity Factors of Parkinson's disease : A Parametric and Bayesian Analysis. Frontiers of Statistics Annual Conference on Data Sciences across Disciplines, 1-2 Apr 2016.
- 5 G.H. Yari, A.R. Mirhabibi, A. Saghafi, A.F. Farahani, A Bayesian approach for modeling ceramic's fracture strength. Proceeding of the 11th Iranian Statistical Conference, 28-30 Aug 2012.
- 4 M. Zarabian, B. Eftekhari Yekta, A. Saghafi, V. Jafarniya, Statistical analysis of flaws in glazed and unglazed ceramic tiles via the Weibull distribution. QUALICER 2012, the Global Congress on Ceramic Tile, 13-14 Feb 2012.
- 3 G.H. Yari, A. Saghafi, Past Renyi Entropy of Reliability Distributions. Proceeding of the 7th Seminar on Probability and Stochastic Processes, 2009.
- 2 M. Zarabian, B.A. Yekta, A. Saghafi, H. Malaei, Prediction of Ceramics Average Strength Using Weibull Statistical Model. Proceeding of the 7th Iran Ceramics Congress, 2009.
- 1 H.D. Hamedani, A. Saghafi, Gambler's Ruin Problem : a Relative Wealth Model with Variable Step Probabilities, Proceeding of 31st Conference of Stochastic Processes and their Applications, Paris, France, Jul 2006.

- 15 K. Regan, A. Saghafi, Z. Lee. Splice Junction Identification using Long Short-Term Memory Neural Networks, *Current Genomics*, 22(5) (2021) 384-390. [🔗 doi:10.2174/1389202922666211011143008](https://doi.org/10.2174/1389202922666211011143008)
- 14 A. Kirkpatrick, A. Saghafi, K. Yang, P. Qiu, J. Alexander, E. Bavry, T. Hanson, R. Schwartzman, Optimizing the treatment of CRPS with Ketamine, *Clinical Journal of Pain*, 36(7) (2020) 516-523. [🔗 doi:10.1097/ajp.0000000000000831](https://doi.org/10.1097/ajp.0000000000000831)
- 13 A. Saghafi, S. Jazayeri, S. Esmaili, C.P. Tsokos, Real-time object detection using Power Spectral Density of Ground Penetrating Radar Data, *Structural Control and Health Monitoring*, 26(6) (2019) 1-10. [🔗 doi:10.1002/stc.2354](https://doi.org/10.1002/stc.2354)
- 12 S. Jazayeri, A. Saghafi, S. Esmaili, C.P. Tsokos, Automatic Object Detection using Dynamic Time Warping on Ground Penetrating Radar Signals, *Expert Systems with Applications*. 122(15) (2019) 102-107. [🔗 doi:10.1016/j.eswa.2018.12.057](https://doi.org/10.1016/j.eswa.2018.12.057)
- 11 A. Saghafi, C.P. Tsokos, R.D. Wooten, On Heredity Factors of Parkinson's disease : A Parametric and Bayesian Analysis, *Advances in Parkinson's Disease*, 7(3) (2018) 31-42. [🔗 doi:10.4236/apd.2018.73004](https://doi.org/10.4236/apd.2018.73004)
- 10 X. Wang, C.P. Tsokos, A. Saghafi, Improved Parameter Estimation of Time Dependent Kernel Density by using Artificial Neural Networks, *Journal of Finance and Data Science*. 4(3) (2018) 172-182. [🔗 doi:10.1016/j.jfds.2018.04.002](https://doi.org/10.1016/j.jfds.2018.04.002)
- 9 A. Saghafi, C.P. Tsokos, H. Farhidzadeh, Common Spatial Pattern method for real-time eye state identification by using electroencephalogram signals, *IET Signal Processing*, 11(8) (2017) 936-941. [🔗 doi:10.1049/iet-spr.2016.0520](https://doi.org/10.1049/iet-spr.2016.0520)
- 8 A. Saghafi, C.P. Tsokos, M. Goudarzi, H. Farhidzadeh, Random Eye State Change Detection in Real-Time using EEG Signals, *Expert Systems with Applications*, 72(15) (2017) 42-48. [🔗 doi:10.1016/j.eswa.2016.12.010](https://doi.org/10.1016/j.eswa.2016.12.010)
- 7 H. Ramezani, A. Saghafi, Optimization of composite double-walled cylindrical shell lined with porous materials for higher sound transmission loss by using Genetic Algorithm, *Mechanics of Composite Materials*, 50(1) (2014) 71-82. [🔗 doi:10.1007/s11029-014-9394-2](https://doi.org/10.1007/s11029-014-9394-2)
- 6 K. Ahmadi, A. Saghafi, Psycho-social Profile of Iranian Adolescent's Internet Addiction, *Cyberpsychology, Behavior, and Social Networking*. 16(7) (2013) 543-548. [🔗 doi:10.1089/cyber.2012.0237](https://doi.org/10.1089/cyber.2012.0237)
- 5 C. Georghiou, A.N. Philippou, A. Saghafi, On the Modes of the Poisson Distribution of Order k, *The Fibonacci Quarterly*. 51(1) (2013) 44-48.
- 4 G. Yari, A.R. Mirhabibi, A. Saghafi, Estimation of the Weibull parameters by Kullback-Leibler divergence of Survival functions. *Applied Mathematics & Information Sciences*. 7(1) (2013) 187-192. [🔗 doi:10.12785/amis/070123](https://doi.org/10.12785/amis/070123)
- 3 G. Yari, A. Saghafi, Unbiased Weibull modulus estimation using Differential Cumulative Entropy. *Communications in Statistics Simulation & Computation*. 41(8) (2012) 1372-1378. [🔗 doi:10.1080/03610918.2011.600498](https://doi.org/10.1080/03610918.2011.600498)
- 2 A.N. Philippou, A. Saghafi, Problem 11-005, A Conjecture on the modes of the Poisson distribution of order k, *Problems and Solutions, SIAM*, (2011). [🔗 SIAM](https://doi.org/10.1137/11P11005)
- 1 A. Saghafi, A.R. Mirhabibi, G. Yari, Improved Linear Regression Method for Estimating Weibull Parameters. *Theoretical and Applied Fracture Mechanics*. 52(3) (2009) 180-182. [🔗 doi:10.1016/j.tafmec.2009.09.007](https://doi.org/10.1016/j.tafmec.2009.09.007)

## GRANTS & AWARDS

---

### **DATA SCIENCE EDUCATION AND CAREER OPPORTUNITIES ACROSS THE UNITED STATES**

Spencer Foundation small grants

The aim of this research proposal was to investigate data science knowledge and skills employers most value in different industries, to identify the gaps in data science education and industry needs, and to propose educational plans to fill out the gaps.

Role : PI Submitted on Jun 2020 Response on Nov 2020

### **SPLICE JUNCTION IDENTIFICATION USING MARKOV CHAIN MODELS**

AWARDED, \$5,000

Faculty Research Bridge Fund (Internal)

The grant is used to support one graduate student in bioinformatics to do research on Splice Junction Identification. We published results of this research in the journal of Current Genomics.

Role : PI Submitted on Mar 2020 Response on May 2020

### **AUTOMATIC ANOMALY DETECTION IN PARTIALLY ACCESSIBLE LOCATIONS**

NSF 17-554, ECI-Engineering for Civil Infrastructure

Aside from developing a highly accurate detection and estimation system in ordinary and challenging situations, the results of this research eliminates the need for expert operators in using GPR. The analytics could be programmed into GPR systems to exploit its capabilities.

Role : PI Submitted on Nov 2019 Response on Jul 2020

### **SUBSURFACE INFRASTRUCTURE MONITORING USING AUTOMATED MACHINE LEARNING ANALYTICS**

Amazon Research Awards

The outcome of this research is more accurate location and depth estimation for multiple buried objects in noisy environments even if they are densely spaced. The analytics could be programmed into GPR systems to exploit its capabilities.

Role : PI Submitted on Oct 2019 Response on Aug 2020

### **THARP ENDOWED SCHOLARSHIP FUND GRADUATE AWARD**

AWARDED, \$500

University of South Florida

For outstanding performance in grad school.

Awarded on 2016

### **RESEARCH GRANT**

AWARDED, \$3,000

Iran Ministry of Science, Research and Technology

For a 6-month sabbatical in Greece and research on distributions of order  $k$ . Later in 2012, we partially solved an open problem since 1983 regarding Poisson distributions of order  $k$ .

Awarded on 2006

### **TRAVEL GRANT**

AWARDED, \$900

Shahid Beheshti University

To present a poster at 31st Conference of Stochastic Processes and their Applications in Paris. My first ever traveling abroad.

Awarded on 2005

## ACTIVE MEMBERSHIPS

---

- › American Statistical Association (ASA)
- › Director of International Affairs at International Federation of Nonlinear Analysis (IFNA)
- › President of AI Global Consulting in Geosciences and Data Science LLC
- › The International Research Foundation for RSD / CRPS
- › USF Interdisciplinary Data Sciences Consortium (IDSC)
- › The U.S. Honorary National Mathematics Society (Pi Mu Epsilon)