

# Mohsen Botlani | Ph.D.

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🌐 [mohbot.github.io/researchProfile/](https://mohbot.github.io/researchProfile/)

Summary: Computational Biologist with more than 10 years of **Data Science and Machine Learning** experience in **Bioinformatics and Health-Informatics** applications.

## Education

- **University of South Florida** **Tampa, FL, USA**  
*Ph.D. in Cell and Molecular Biology (Computational Biology)* *July 2017*
- **Isfahan University of Technology** **Isfahan, Iran**  
*B.Sc. in Materials Science and Engineering* *Sep 2008*

## Work Experiences

- **M2GEN-Moffitt Cancer Center.** **Tampa, FL, USA**  
*Bioinformatics Staff Scientist* *April 2018 – Present*  
**Developing scalable pipelines for NGS upstream and downstream data analysis (RNAseq and Whole Exome Sequencing (WES))**
  - Biomarker development (on immuno-oncology cohorts) including gene expression, copy number, Internal Tandem Duplication (IDT), Microsatellite Instability (MSI) and Tumor Mutation Burden (TMB) analysis
  - Pan-cancer tissue of origin classification with machine learning, deep learning methods (using gene expression, copy number and mutation data)
  - Pipeline development for CNV, LOH, tumor sub-colonality, purity and ploidy estimation
  - RNAseq tumor purity estimation (based on Single-cell RNA seq)
  - Multi-omics analysis for downstream analysis as well as QC control considering effect of latent variables such as cancer types, preservation methods and batch effects
  - Automated QC pipeline development via integration of database with DNAnexus' API in the cloud to create QC reports of WES and RNAseq
- **WellCare Health Plans, Inc.** **Tampa, FL, USA**  
*Data Scientist* *Jan 2018 – April 2018*
  - Developed customer retention model using machine learning methods (Gradient boosting, Logistic regression and Random forest.)
  - Developed all-cause mortality models based on members' age, gender and common laboratory tests by machine learning methods (Gradient boosting, Random forest, Logistic regression)
- **Moffitt Cancer Center-Internship** **Tampa, FL, USA**  
*Bioinformatics Scientist Intern* *Aug 2017 – Jan 2018*
  - Pipeline development for detecting cancer-associated germline mutations (TCGA WES raw data)
- **University of South Florida-Ph.D.** **Tampa, FL, USA**  
*Ph.D. Student and Graduate Researcher* *Aug. 2012 – Aug 2017*
  - Developing mathematical and computational models using machine learning and graph theory methods to elucidate dynamic allostery in proteins
  - Investigating the effect of different MD force fields on simulating the D-band Length of type I collagen
- **Mobarakeh Steel Company** **Isfahan, Iran**  
*Data Analyst* *Aug 2008 – Aug 2010*
  - Developed machine learning models to predict mechanical properties of steel products

## Technical and Personal skills

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- **Programming Languages:** Python, R, C++, C#, MATLAB, SQL, Bash scripting, Cloud-app development, Docker and Version Control
- **Libraries:** Python (Numpy, Pandas, scikit-learn, H2O, PySpark, Keras, TensorFlow, Scipy, StatsModels, Jupyter, seaborn), R (pamr, limma, fgsea, sva, tidyverse), MATLAB (neural networks, genetic algorithm and optimization, bioinformatics, parallel computing, symbolic math, curve Fitting)
- **Bioinformatics:** Biopython, bioconductor, bowtie2, Pysam, samtools, BCFtools, bedtools, maftools bcbio-nextgen (bwa, freebayes, GATK), Sentieon, CNVKit, TitanCNA, STAR, STAR-Fusion, RSEM, ESTIMATE, DNAnexus, GDC, UCSC genome browser, IGV, cbiportal
- **Computational Biology:** Gromacs, LAMMPS, Pdynamo, AutoDock, Schrödinger, CAChe, Moldock, Modeller and Materials Explorer

## Publications

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- **M. Botlani**, G. Blanck, "Systematic analysis of germline mutations of tumor suppressor genes impacting earlier age of onset in 11 cancer types. *In preparation*.
- **M. Botlani**, A. Siddiqui, S. Varma, "Machine Learning Enabled Approach to Incorporate Multi-State Information in Molecular Modeling of Dynamic Allostery: A Case Study of the PDZ2 Domain", *Journal of Chemical Physics*, 2018.
- **M. Botlani**, S. Varma, "Machine learning enabled approach to determine correlations in ensemble shifts: a case study of the PDZ2 domain" *Biophys. Soc. Meet., New Orleans*, 2017.
- P. Dutta, A. Siddiqui, **M. Botlani** and S. Varma, Inter-monomer Rearrangements in Allosteric Stimulation of Nipah Virus Host Binding Protein. *Biophys. J.*, 2016.
- **M. Botlani**, A. Siddiqui, S. Varma., "Quantifying Conformational Ensemble Changes in Proteins Using Inverse Machine Learning", *Intelligent Systems For Molecular Biology(ISMB)*, Orlando, 2016.
- S. Varma, **M. Botlani**, J. Hammond, H.L. Scott, J.P.R.O Orgel and J.D. Schieber, "Effect of Intrinsic and Extrinsic Factors on the Simulated D band Length of Type I Collagen", *Proteins*, 2015.
- C.N. Krute, R. K. Carroll, F.E. Rivera, A. Weiss, R.M. Young, A. Shilling, **M. Botlani**, S. Varma, Bill J. Baker and Lindsey N. Shaw, "The Disruption of Prenylation Leads to Pleiotropic Rearrangements in Cellular Behavior in *Staphylococcus aureus*", *Molecular Microbiology*, 2014.
- P. Dutta, **M. Botlani**, S. Varma, "Water Dynamics at Protein-Protein Interfaces: A Molecular Dynamics Study of Virus-Host Receptor Complexes", *J. of Phys. Chem. B*, 2014.
- **M. Botlani**, S. Varma, R.E. Leighty, "Discerning intersecting fusion-activation pathways in the Nipah virus using machine learning", *Biophys. Soc. Meet., San Francisco*, 2014.
- S. Varma, **M. Botlani**, R.E. Leighty, P. Dutta, "Using machine learning to understand the allosteric regulation of biomolecules", *Gordon research conference, Maryland*, 2014.
- S. Varma, **M. Botlani** and R.E. Leighty, "Discerning intersecting fusion-activation pathways in the Nipah virus using machine learning", *Proteins*, 2013.
- **M. Botlani**, M. R. Toroghinejad, "Application of Bayesian Neural Networks to Predict Strength and Grain Size of Hot Strip Low Carbon Steels", *Artificial Neural Networks - Industrial and Control Engineering Applications, Intech, Austria, Book Chapter*, 2010.
- **M. Botlani**, M. R. Toroghinejad, "Application of Bayesian MLP Networks and RJMCMC to Predict the Grain Size of Hot Strip Low Carbon Steels", *J. Ser. Chem. Soc.*, 2010.
- **M. Botlani**, M. R. Toroghinejad, A. R. Key Yeganeh, "Modeling the Yield Strength of Hot Strip Low Carbon Steels by Artificial Neural Network", *J. of Mat. and Des.*, 2009.
- **M. Botlani**, M. R. Toroghinejad, A. R. Key Yeganeh, "Modeling the Yield Strength of Hot Strip Low Carbon Steels by Artificial Neural Network", *ISIJ*, 2009.