RAHUL VERMA

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SUMMARY

Experienced geospatial data scientist and numerical programmer with a demonstrated history of working on complex problems and delivering high value solutions.

- Extensive experience applying machine learning algorithms to a variety of problems spanning petroleum engineering, petrophysics, exploration, geology, and chemical engineering
- Proven track record of collaborating with client domain experts in a variety of fields to produce high-value solutions
- Skilled in multiple programming languages (Python, C++, Fortran), including parallel computing tools
- Experience deploying machine learning solutions using AWS tools in high impact projects, familiarity with cloud solutions

EDUCATION

The University of Texas at Austin — Austin, Texas
PhD, Petroleum Engineering — Aug 2018

The University of Texas at Austin — Austin, Texas
Master of Science, Petroleum Engineering — December 2014

Indian Institute of Technology — Guwahati, India
Bachelor of Engineering, Chemical Engineering — May 2010

Springboard Data Science Career Track — January-May, 2018
Data Science/Machine learning certification

INDUSTRY EXPERIENCE

OAG Analytics - Senior Research Data Scientist — January 2020 - Present

- Responsible for creating machine learning solutions as part of OAG's engagement with BHP for projects in copper and petroleum exploration, part of the Joint Global Endowment team
- Responsible for creation of 100+ feature rasters Worked with geochemistry, structure, and geophysics datasets, combining into a machine learning-ready dataset
- Project lead for OAG's engagement with TIBCO for demonstrating application of autoencoders for anomaly detection in time series data

OAG Analytics - Petrophysicist/Data Scientist — August 2018 - January 2020

- Responsible for feature generation for machine learning models using fundamental physics insights
- Conceptualized and executed machine learning solution for identifying and predicting "frac hits", solution was delivered to customer using an AWS-hosted interactive bokeh web app, and is currently being used in the field as part of a multi-million dollar project
- Built interactive bokeh tool to quantify uncertainty in well log measurements using data science approaches
- Proposed and executed algorithms for quantifying parent-child well interactions to implement as features for machine learning models

Chevron - Petroleum Engineering Intern May - August 2015, May-August 2014

- Developed new techniques to quantify petrophysical properties from high resolution thin-section carbonate rock images from Chevron's Tengiz reservoir
- Generated relative permeability and capillary pressure properties for both carbonate samples (conventional reservoirs), and shales (unconventionals, from Vaca Muerta, Argentina)
- Worked on relating wettability and organic content measurements to values measured from thin sections
- Conducted training seminar for company employees, deploying newly developed algorithm in actual field projects

Reliance Industries Limited - Manager, Jamnagar Refinery August 2010 - July 2012

- Developed data-driven model for predicting product quality in alkylation unit, based on combination of chemical reactor modeling and non-linear optimization of plant data
- Developed model for predicting product quality in hydrotreating units, using neural networks and non-linear optimization on large multi-year datasets
- Deployed models as Visual Basic tools for use by plant operators
- Used commercial CFD software Fluent to troubleshoot Sundyne pumps by modeling cavitation using multiphase fluid dynamics with moving meshes

SKILLS

Programming languages	Python, C/C++, Fortran, MATLAB
Machine learning	scikit-learn, keras, PyTorch
Parallel computing	MPI, OpenMP, OpenCL
Data engineering	pandas, dask
Visualization Software	Matplotlib, Seaborn, Plotly, Bokeh, ImageJ, Paraview
Other software	LaTeX, OpenFOAM, Palabos, LSMPQS

ACADEMIC EXPERIENCE

Research Assistant, The University of Texas at Austin August 2012-August 2018

- Developed new algorithms based on quasi-static level set methods and lattice Boltzmann modeling for understanding capillary-dominated flow at the pore-scale in rocks
- Proposed novel way of modeling trapping and wettability, resulting in multiple journal publications
- Developed the parallelized LSMPQS level set library, written in C/Fortran, and Python/MATLAB: LSMPQS-1.0
- Related results to experimental datasets at larger scales, quantifying effects of wettability in multiphase flow.

Teaching Assistant, The University of Texas at Austin August 2014 - May 2015

- Conducted office hours, taught classes and created content for both graduate and undergraduate courses
- Courses: Thermodynamics, Formation and solution of geosystems problems, Transport Phenomena

Research Assistant, RWTH Aachen, Germany May 2009 - July 2009

- Worked on development of a Poisson solver using the GMRES algorithm, funded by a scholarship from the German embassy

PUBLICATIONS

Mehmani, **Verma**, Prodanovic (2019): Pore scale modeling of carbonates, *Marine and Petroleum Geology*

Zhao, **Verma** *et al.* (2019): Comprehensive comparison of pore-scale models for multiphase flow in porous media, *Proceedings of the National Academy of Sciences*

Verma, Icardi, Prodanovic (2018): Effect of wettability on two-phase quasi-static displacement - validation of two pore-scale modeling approaches, *J. of Contaminant Hydrology*

Chen, **Verma**, Prodanovic, Espinoza (2017): Pore-scale determination of relative permeability in hydrate-bearing sediments using X-Ray computed micro-tomography and lattice Boltzmann simulation, *Water Resources Research*

CONFERENCE PAPERS/POSTERS/PRESENTATIONS

Pore-scale modeling of trapping in heterogeneous-wet porous media. *Poster, 13th International Symposium on Reservoir Wettability and its Effects on Oil Recovery, 2018*

Connectivity and relative permeability of the intermediate-wet phase in immiscible three phase displacement. *Poster, Flow and Transport in Porous Media, Gordon Research Conference, 2018*

Chopra, **Verma**, Lane, Willson, Bonnecaze (2017): A method to accelerate creation of plasma etch recipes using physics and Bayesian statistics, *Proceedings Volume 10149, Advanced Etch Technology for Nanopatterning VI; 101490X (2017)*; SPIE Advanced Lithography, 2017, San Jose, California, United States

Chopra, Helpert, **Verma**, Zhang, Zhu, Bonnecaze (2017): A model-based, Bayesian approach to the CF4/Ar trench etch of SiO2, *Proceedings Volume 10588, Design-Process-Technology Co-optimization for Manufacturability XII; 105880G (2018), SPIE Advanced Lithography, 2018*

Modeling and experiments for fractional-wet rhomboidal pores. *Poster, American Physical Society, March Meeting, 2017*

Application of uniform and fractional-wet modeling approaches to wettability at the pore scale. *Poster, 9th International Conference on Porous Media, InterPore, 2017*

Validation of pore-scale modeling approaches to wettability. *Oral presentation, 12th International Symposium on Reservoir Wettability and its Effects on Oil Recovery, 2016*

Estimation of three-phase relative permeability from micro-tomography experiments. *Oral presentation, American Geophysical Union Fall Meeting, 2013*

AWARDS AND EXTRA-CURRICULAR ACTIVITIES

Olympiads: Indian National Chemistry Olympiad, 2005, National Science Olympiad, regional Mathematics Olympiad, 2005

Scholarships: KC Mahindra Scholarship for post graduate studies (May 2012), WISE Scholarship (May 2009)

Sports: Intramural soccer team at UT Austin, swimming, badminton