rahul verma

phd candidate

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summary

Experienced numerical programmer with a demonstrated history of working on complex research problems.

- Skilled in multiple programming languages (Python/C/C++), including parallel computing tools (OpenMP/MPI), and familiarity with machine learning algorithms.
- PhD research focused on advanced interface-capturing techniques, mainly level set methods, applied to capillary-dominated multiphase flow in porous media.
- Other projects include reactor modeling using data analytics, image analysis-based rock property quantification, data-driven analysis of oil price impact on local economies and modeling multiphase fluid dynamics in pumps.

employment

Sandbox Semiconductor — Austin, TX

Computational Engineer
Jan 2017 to Apr 2018

- Implemented level set methods for simulating a patent-pending machine learning model for etching in semiconductors. Work presented in several international conferences
- Used Python to construct reaction database, and interface with C/C++ library
- Supervised offshore team to make user interface for software, and connect it to computational model

Chevron — Houston, TX

Petroleum Engineering Intern
May 2014 to Aug 2014, May 2015 to Aug 2015

- Developed new techniques to analyze large dataset (~1 TB) of high resolution rock images from Chevron's Tengiz oil reservoir
- Generated relative permeability and capillary pressure properties for both carbonate samples (conventional reservoirs), and shales (unconventionals, from Vaca Muerta, Argentina)
- Worked on relating petrophysical properties like 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 — Jamnagar, India

Technical Manager
Aug 2010 to May 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

education

University of Texas at Austin
PhD Petroleum Engineering 2018
MS Petroleum Engineering 2014

Indian Institute of Technology Guwahati
B. Tech. Chemical Engineering 2010

Springboard
Data Science Career Track 2018

projects

PhD thesis — Aug 2012 to Current

- 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.

Impact of oil price fluctuations on local area economies — Jan 2018 to May 2018

- Quantify effects of oil price crashes on the unemployment levels in individual districts/counties heavily dependent on the industry
- Combined oil/gas production data for multiple decades from the Railroad Commission of Texas, relating it to oil price, and other economic indicators for a given county like unemployment rate
- Built statistical models to try and predict impact of oil price fluctuations in a given economy

skills

PROGRAMMING LANGUAGES: C, Python, Matlab, C++, Fortran
PARALLEL COMPUTING: OpenMP, MPI
DATA SCIENCE/ML: pandas, scikit-learn, statsmodels, SQL
VISUALIZATION: Matplotlib, Seaborn, Bokeh, ImageJ, Paraview
OTHER SOFTWARE: Latex, OpenFOAM, Palabos, LSMPQS