ABHISHEK D. BIHANI

+1-786-620-6480 | abihani@utexas.edu | linkedin.com/in/abihani/ | abhishekdbihani.github.io/

Researcher experienced in Scientific Computing, Computer Vision, and Machine/Deep Learning

EDUCATION

The University of Texas at Austin, USA

Ph.D. in Petroleum Engineering | GPA: 3.70/4 — May 2020

M.S. in Petroleum Engineering | GPA: 3.81/4 — May 2016

Areas of Focus: Subsurface Machine / Deep Learning, Computational Fluid Simulations in Porous Media, Petrophysics

Udacity

Nanodegree in Computer Vision — February 2020

Maharashtra Institute of Technology, University of Pune, India

B.E. in Petroleum Engineering | Grade: 73.98/100 (1st Class with Distinction) — May 2011

Honors: Silver Medalist (2nd rank)

GRE: 327/340 (scaled), TOEFL: 114/120, IELTS: 9.0/9.0

TECHNICAL SKILLS

Python (NumPy, PyTorch, SciPy, Pandas, Scikit-learn, Matplotlib, OpenCV, TensorFlow, XGBoost), C++ (Palabos, LIGGGHTS, OpenMP, MPI), MATLAB, AWS (SageMaker), MySQL, Analytics (Tableau, SPSS), Git, Bash

KEY PROJECTS

Multiphase LBM Toolbox: Permeable media analysis using the Palabos library and in-house codes

Co-developed a computational simulation toolbox for modeling multiphase flows on high-performance computing (HPC) resources, and characterizing petrophysical properties of complex porous geometries. The toolbox uses the Palabos library (C++) for lattice Boltzmann (LBM) simulations and in-house scripts created in MATLAB for geometry characterization.

Semantic segmentation of mudrock electron microscope images

Constructed conventional (MATLAB) and convolutional neural network (Deeplab-v3+ with TensorFlow) based image processing and segmentation workflows to identify features like pores, silt, and clay from scanning electron microscope (SEM) images with > 90% pixel-accuracy, and improving mean intersection over union (mIoU) results (~ 0.75) over the random forest method (~ 0.5).

Synthetic NMR Well-log Construction using Machine Learning

Generated a workflow for synthetic reconstruction of a missing nuclear magnetic resonance (NMR) well log from other well logs at a Gulf of Mexico location, through feature engineering, time-series analysis techniques, and multivariate polynomial regression modeling using the Scikit-learn library to increase the training R^2 value from 0.26 (multivariate linear regression) to 0.54.

Uniaxial Compaction and Force-chain Analysis of Bidisperse Grain packs

Created a workflow to simulate creation of a bidisperse (two radii) grain pack under gravity and study the grain behavior (force-chain analysis/co-ordination number analysis) subjected to uniaxial compaction, using the LIGGGHTS library (C++) on HPC resources.

ACADEMIC EXPERIENCE

Graduate Researcher – The University of Texas at Austin **August 2014 – May 2020**

- **Ph.D. Research:** Combined deep learning aided image analysis, pore network modeling, and lattice Boltzmann flow simulations to study the structure of mudrock seals and showed that correlated heterogeneity enhances flow of CO_2/hydrocarbons by publishing results in one peer-reviewed journal, four conferences and a 260+ page dissertation.
- **M.S. Research:** Investigated pore size distributions and methane equilibrium conditions in northern Gulf of Mexico by correlating reconstructed well logs with seismic data for estimating depth and thickness of methane hydrate accumulations using petrophysical and machine learning methods, and published results in two conferences and a 100+ page thesis.

INDUSTRY EXPERIENCE

Reservoir Engineer – Oil India Limited **October 2011 – July 2014**

- Collaborated in a massive, multi-disciplinary reservoir and well-level analysis for 500+ wells by statistical analysis and modeling and led the Improved Oil Recovery (IOR) team to make recommendations which created a 3000+ barrel/day rise in oil production.
- Built a non-linear multivariate regression model for prediction of crude oil viscosity behavior ($R^2 = 0.57$) using experimental data from 162 wells.

Summer Intern – Essar Oil Limited **June 2010 – July 2010**

- Conducted history matching, production forecasting, and sensitivity analysis by the Monte Carlo method on 10 coal-bed methane wells to reduce uncertainty in input data by ~ 5%.

PROFESSIONAL DEVELOPMENT
Awards
- Department of Petroleum and Geosystems Engineering Research Award   GAIN Conference Austin, 2019
- Advanced Communicator Bronze / Competent Leader   Toastmasters International, 2011

Grants and Fellowships
- Statoil/Equinor Fellowship   UT Austin, 2016 – 2019
- Research Fellowship, U.S. Department of Energy   UT Austin, 2014 – 2016

Service
- Graduate Faculty Selection Committee   UT Austin, 2017 – 2019
- Presiding Officer – Dibrugarh Constituency, Indian Parliamentary Election   Election Commission of India, 2014
- Vice President, Public Relations   Toastmasters Club of Pune – West, 2010 – 2011
- President   Society of Petroleum Engineers Student Chapter, 2010 – 2011

SELECTED JOURNAL & CONFERENCE PUBLICATIONS

- **A. Bihani,** H. Daigle (2019). On the Role of Spatially Correlated Heterogeneity in Determining Mudrock Sealing Capacity for CO_2 Sequestration. Marine and Petroleum Geology, 106(106), 116–127. https://doi.org/10.1016/j.marpetgeo.2019.04.038

- **A. Bihani**, H. Daigle, J. Santos, C. Landry, M. Prodanović, K. Milliken (2019). H44B-06: Insight into the Sealing Capacity of Mudrocks determined using a Digital Rock Physics Workflow. Texas Advanced Computing Center Symposium for Texas Researchers (TACCSTER), 26-27 September, Austin, TX, USA. http://dx.doi.org/10.26153/tsw/6874

- **A. Bihani** (2018). The effects of lifting the U.S. oil export ban on market equilibrium. Journal of Petroleum Resource Economics.

- **A. Bihani,** H. Daigle (2018). ID 266. Investigating Capillary Pressure Behavior in Mudrocks through Grain Scale Modeling. Interpore Annual Meeting, 14-17 May, New Orleans, USA.

- H. Daigle, A. Cook, A. Malinverno, M. Nole, **A. Bihani**, R. Andris, L. Wei, J. Hillman (2017). P 1693- Methane transport and accumulation in coarse-grained reservoirs in the Terrebonne Basin, northern Gulf of Mexico, 9th International Conference on Gas Hydrates, June 25-30, Denver, CO.

- **A. Bihani,** H. Daigle, et. al. (2015). OS23B-1999: Pore Size Distribution and Methane Equilibrium Conditions at Walker Ridge Block 313, Northern Gulf of Mexico. AGU Fall Meeting, 14-18 December, San Francisco, USA.

- D. Jain, **A. Bihani** (2014). PETROTECH A-2238: Crude oil viscosity correlations: A Novel approach for Upper Assam Basin. Petrotech Conference, New Delhi, India.

- Z. Haindade, **A. Bihani**, et. al. (2012). SPE 157119: Enhancing Flow Assurance using Co-Ni Nanoparticles for Dewaxing of Production Tubing. SPE International Oilfield Nanotechnology Conference & Exhibition, 12-14 June, Noordwijk, Netherlands. https://doi.org/10.2118/157119-MS

- A. Arora, **A. Bihani**, et. al. (2011). IPTC 14669: Side-wall Coring: Advanced In-situ Freeze-Core Technique. International Petroleum Technology Conference, 15-17 November, Bangkok, Thailand. https://doi.org/10.2523/IPTC-14669-MS