ABHISHEK D. BIHANI, PH.D.

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AWS certified researcher skilled in data science, machine learning, and computer vision with multiple research publications

EDUCATION

The University of Texas at Austin, USA

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

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

Areas of Focus: Subsurface Machine/Deep Learning, Computational Fluid Dynamics (CFD), Image Processing & Analysis

Maharashtra Institute of Technology, University of Pune, India

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

Honors: Silver Medalist (2nd rank)

PROFESSIONAL CERTIFICATIONS

AWS Certified Machine Learning Specialty - MLS-C01 — Nov 2020

Udacity Nanodegree - Machine Learning Engineer — Jul 2020

Udacity Nanodegree - Computer Vision — Feb 2020

TECHNICAL SKILLS

Python (NumPy, Pandas, SkLearn, Matplotlib, Seaborn, OpenCV, PyTorch, TensorFlow, Keras, PySpark, XGBoost, LightGBM, Featuretools, Hyperopt), C++ (Palabos), MATLAB, AWS (SageMaker, S3, EC2, ECR, Kinesis, Glue, Athena, QuickSight), SQL, Analytics (Tableau, SPSS), Git, Bash

KEY PROJECTS

MudrockNet: Semantic segmentation of mudrock electron microscope images | GitHub

Constructed conventional (MATLAB) and CNN-based (Deeplab-v3+ with TensorFlow) image processing and segmentation workflows to identify grain-scale features from scanning electron microscope (SEM) images with ~0.75 mean intersection over union.

Synthetic NMR Well-log Construction using Machine Learning | GitHub

Generated a workflow for synthetic reconstruction of a missing well log from other logs, through feature engineering, time-series analysis techniques, and multivariate polynomial regression (Scikit-learn) to increase training R^2 value from 0.26 (base-case) to 0.54.

Home Credit Default Risk Recognition using Machine Learning | GitHub

Created a machine learning pipeline for binary classification with automated feature engineering using ETL functions, comparison of multiple classifiers on imbalanced data, and automated hyperparameter tuning to achieve a test ROC AUC score of 0.786.

MP-LBM-UT: Multiphase LBM Toolbox for permeable media analysis | GitHub

Co-developed and released an open-source simulation toolbox for modeling multiphase flows on high-performance computing (HPC) resources, and characterizing petrophysical properties of complex porous geometries using Palabos library (C++) and MATLAB.

ACADEMIC EXPERIENCE

Graduate Researcher – Center for Subsurface Energy & Environment, University of Texas at Austin Aug 2014 – May 2020

- **Ph.D. Research:** Used deep learning aided image analysis to segment and quantitatively study mudrock images, and conducted numerical flow simulations to examine risk of underground fluids like oil, gas or stored CO_2 leaking across the rock seals by publishing results in peer-reviewed journals, 3 conferences and a 266 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 2 conferences and a 101 page thesis.

INDUSTRY EXPERIENCE

Reservoir Engineer – Geology & Reservoir Department, Oil India Limited Oct 2011 – Jul 2014

- Worked jointly with Finance Department to calculate reserve accretion and profits using scenario modeling and decline curve analysis predictions, which were reported to stockholders and Indian Parliament for financial years 2012 and 2013.
- 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 led to 3000+ barrel/day rise in oil production.
- Built non-linear multivariate regression models for crude oil viscosity prediction (R^2=0.57) using experimental data from 162 wells.

INDUSTRY EXPERIENCE

Undergraduate Intern – Oil and Natural Gas Corporation of India (ONGC) Jan 2011 – Jun 2011

- Collaborated with team using nodal analysis to reduce pressure losses and optimize gas injection during flow from the reservoir to the wellbore and improved the oil recovery by 90 barrel/day.

Summer Intern – Essar Oil Limited Jun 2010 – Jul 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

Leadership & Teamwork

Graduate Faculty Selection Committee UT Austin, 2017 – 2019

- Interviewed potential new department faculty, met external department reviewers, and conducted outreach activities

Presiding Officer – Dibrugarh Constituency, Indian Parliamentary Election Election Commission of India, 2014

- Supervised team of six allowing 749 people to vote in the Indian Parliamentary election of 2014

Vice President, Public Relations Toastmasters Club of Pune – West, 2010 – 2011

- Promoted Toastmasters to public by maintaining club website, editing club magazine, and interviewing with local newspapers

President Society of Petroleum Engineers Student Chapter, 2010 – 2011

- Organized national-level conference by raising $ 6000 and received the Gold Standard award for exceptional work

Awards

Department of Petroleum and Geosystems Engineering Research Award GAIN Conference Austin, 2019

- Award for best research poster among 20+ candidates

Advanced Communicator Bronze / Competent Leader Toastmasters International, 2011

- Awards for completing 20 public speaking assignments and holding 10+ roles in Toastmasters meetings

Ravindra Kulkarni Silver Medal Maharashtra Institute of Technology, 2011

- Award for 2nd highest grade in graduating class of 70+ students

Grants and Fellowships

Statoil/Equinor Fellowship UT Austin, 2016 – 2019

- Doctoral Fellowship for 3 years of $58,000 per year for studying flow in porous media through numerical simulations

Research Fellowship, U.S. Department of Energy UT Austin, 2014 – 2016

- Masters Fellowship for 2 years of $55,000 per year for studying deposition and flow of methane hydrates in the Gulf of Mexico

SELECTED PUBLICATIONS

- **A. Bihani**, H. Daigle, J. Santos, C. Landry, M. Prodanović, K. Milliken (in review). MudrockNet: Semantic Segmentation of Mudrock SEM Images through Deep Learning. Submitted to Computers & Geosciences.
- **A. Bihani**, H. Daigle, J. Santos, C. Landry, M. Prodanović, K. Milliken (in review). Investigating Silt Bridging in Marine Muds of the Kumano Forearc Basin through Image Analysis. Submitted to Marine & Petroleum Geology.
- **A. Bihani**, H. Daigle (in-review). Seal Capacity, Force Chains, and Percolation in Silt-Clay Mixtures. Journal of Geophysical Research- Solid Earth. https://doi.org/10.1002/essoar.10504349.1
- **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. doi.org/10.1016/j.marpetgeo.2019.04.038.
- **A. Bihani**, H. Daigle, J. Santos, C. Landry, M. Prodanović, K. Milliken (2019). 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. doi.org/10.26153/tsw/6874