Raja Biswas

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Education

- **National University of Singapore (NUS)** — Singapore
  PhD in Civil Engineering, GPA: 3.92/4 — *Jan. 2014 – Aug. 2018*
- **Indian Institute of Technology, Kanpur (IIT Kanpur)** — Kanpur, India
  B.Tech. in Civil and Environmental Engineering, GPA: 9.30/10 (*Rank 3*) — *Jun. 2009 – May. 2013*

Experience

- **Research Fellow, NUS** — Singapore
  Micro to Macro Scale Transition using Machine Learning — *Oct. 2018 - Present*
  - Built a deep neural network to predict homogenized stress-strain relationships of complex systems
  - Generated training set with 2k+ observations by resolving microstructural boundary value problems with periodicity constraints to enforce strain tensors spanning the input space
  - Augmented the input dimension with generated features based on underlying physics and mechanics
  - Trained neural networks in Keras using Adam optimizer, dropout regularization, and batch normalization
  - Predicted homogenized stress values with <2% mean absolute error on test set
- **PhD Scholar, NUS** — Singapore
  Micromorphic Computational Homogenization of Heterogeneous Structures — *Jan 2014 - August 2018*
  - Developed a predictive multiscale model that accurately captures the influence of underlying mechanisms
  - Formulated a bottom-up solution algorithm ensuring consistent transition from micro to macro scale
  - Developed python scripts using Pandas and Numpy for numerical implementation of the multiscale model
  - Demonstrated predictive capability by resolving 15% error in standard multiscale homogenization model
  - Achieved a computational speed up of 3 folds than the reference direct numerical simulations
- **Summer Intern, University of Rostock** — Rostock, Germany
  Efficiency Increase in Geomaterials Texture and Organic Matter Analysis — *May. 2012 - Jul. 2012*
  - Automated textural analysis of granular materials using Sedimat 4-12 Robot
  - Redesigned chemical pretreatment process using an efficient ultrasonic disaggregation technique
  - Reduced total analysis time by 4 folds without compromising on accuracy

Awards

- **Student Competition Winner**: best student paper presentation in EMI 2017 Conference, San Diego, CA, Jun. 4-7
- **President's Graduate Fellowship**: exceptional promise and accomplishment in research, NUS, Jan 2014 – Jan 2018
- **DAAD-WISE Scholarship**: German academic exchange for summer intern in University of Rostock, May –Jul. 2012
- **Academic Excellence Award**: excellent coursework performance at IIT Kanpur in academic year 2010-11, 2011-12

Projects

- **Recommendation System**: *Data Science Project, Python, Web Scraping, JSON, TF-iDF, word2vec, NLTK*
  - Built a content based based recommender system to suggest personalized tourist attractions
  - Scraped web using Selenium and Beautiful Soup libraries to create a database with 20k+ points of interest
  - Recommended tourist attractions aligned with user interests using cosine similarity
- **Petfinder.my Adoption Prediction**: *Kaggle Data Science Competition, Python, Pandas, XGBoost, API*
  - Built a XGBoost model to predict adoption speed of pets in Malaysia
  - Integrated image metadata and sentiments generated from Google Vision and Natural Language API for improving predictive capability

Skills

- **Programming Languages**: Python, FORTRAN, C, SQL **Software**: Matlab, LATEX, Abaqus, Arc-GIS
- **Courses**: Deep Learning Specialization (Coursera), Linear Algebra, Probability & Statistics, Advanced FEM
- **Libraries**: NumPy, Pandas, SciKit-Learn, SciPy, Matplotlib, Seaborn, Selenium, TensorFlow, Keras, NLTK