

Raja Biswas

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EDUCATION

- **National University of Singapore (NUS)** Singapore
PhD in Civil Engineering, GPA: 4.92/5 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 achieving 4 fold speed-up
 - Redesigned chemical pretreatment process using an efficient ultrasonic disaggregation technique

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

- **National Data Science Challenge 2019:** *Shopee, CNN, NLP, Stacking, Transfer Learning, LSTM, MobileNet*
 - Built a product category classifier in the eCommerce domain by ensembling predictions from image and text based models with gradient boosting, which ranked 3/360 in the competition private leaderboard
 - Trained deep NN for image classification using bottleneck features extracted from the MobileNet architecture
 - Summarized the results and implementation details in a report: <https://rbiswasfc.github.io/ndsc-shopee/>
- **Recommendation System:** *Data Science Project, Python, Web Scraping, JSON, TF-IDF, word2vec, NLTK*
 - Built a content based recommender system to suggest personalized tourist attractions
 - Scraped web using Selenium and BeautifulSoup 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

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:** Pandas, SciKit-Learn, Matplotlib, Selenium, TensorFlow, Keras, PyTorch, Gensim, XGBoost