Abhinav Khare

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Education

University at Buffalo (UB) Buffalo, NY, USA
Ph.D. Candidate in Operations Research; GPA: (3.93) *Sept 2017 – May 2021*

University at Buffalo (UB) Buffalo, NY, USA
Masters in Operations Research; GPA: (3.916) *Sept 2015 – Sept 2017*

Delhi College of Engineering Delhi, India
Bachelor of Technology in Industrial Engineering; GPA: (3.7) *Aug 2009 – June 2013*

Expertise

• Machine Learning • Natural Language Processing • Statistics • Mixed Integer Programming • Optimization

Programming Skills

Languages: Python, R, SQL **Tools**: TensorFlow, Keras, Spark, scikit-learn, CPLEX, Gurobi

Experience

Amazon, Inc. New York, NY
Research Scientist, Alexa NLU *July 2022 - Present*

- **Improving accuracy, evaluating and deploying of Non-english NLU models [Python, Bash scripting]**
  - Experimenting with Reward Models for training RLHF in Large Language Models in multilingual settings.
  - Developed and A/B tested methods to tune NLU model confidence thresholds to minimise customer perceived defects.
  - Developed and A/B tested methods to improve NLU model calibration to minimise customer perceived defects.

JPMorgan Chase and Co. New York, NY
Senior Applied AI/ML Associate *May 2021 - July 2022*

- **AI Applications for Corporate and Investment Bank [Python]**
  - Developed the rule based algorithm for a self service tool of market manipulation detection
  - Developed a ML method that predicts non-optimal trade executions to improve trading strategy
  - Developed a NER methodology to extract signals for valuations of illiquid assets using chats on trading platforms.

Applied Operations Research Lab, University at Buffalo Buffalo, NY
Research Assistant *Jan 2016 - Present*

- **NLP and Optimsation model for optimising PPE distribution in pandemics [Python, TensorFlow]**
  - Built a BERT based neural network to identify tweets that sense future PPE shortage and hospitalisations
  - Developed a Mixed Integer Program for dynamic sharing and re-distribution of PPEs in order to minimise shortage at different demand points
- **NLP & Time Series Models to forecast Essential Commodity's Demand in Disasters [R, Python, Keras]**
  - Built SVM, topic models and neural networks to classify tweets about gasoline shortage achieving a F-score= 0.876.
  - Built a Loss Function combining ARIMA & Regression to forecast gasoline demand via tweets and accurately forecasted gasoline shortage in 8 major cities of Florida achieving MAPE = 0.31
- **Bayesian Inference & Discrete Optimisation for Commodity Search in Disasters [Python, CPLEX]**
  - Developed a Bayesian Network to inferred the probability of shortage at gas stations using location & time of tweets
  - Inferred probability using MCMC & Variational Inference methods with 92% accuracy for Hurricane Irma shortage
  - Modeled a novel problem of finding the optimal search route on a network with finite probabilities of finding an entity on each node and developed an efficient solution method reducing evacuation times during Hurricane Irma by 17%
- **Vehicle Route Optimisation on Tree Graphs for Humanitarian Relief Supply [Python, CPLEX]**
  - Modeled the NP-hard humanitarian relief supply problem of Nepal earthquake and developed an extremely efficient solution method achieving 1000 fold reduction in computational time over CPLEX
  - Decomposed the problem into Multiple Bounded Knapsack & Vehicle Routing on Tress with Split Delivery (apporx*)
  - Developed polynomial time algo. to solve vehicle routing on trees with split delivery & Multiple Bounded Knapsack

NBCUniversal Media LLC Orlando, FL

Data Scientist Intern *June 2019 - Sept 2019*

- **Dynamic Pricing of Tee Times at Golf Courses. [Python, Keras]**
  - Developed a python module for dynamic pricing of golf tee times on GolfNow resulting in revenue increase of 5 %.
  - Built deep learning & xgboost models to predict the demand for different golf courses achieving RMSE = 1.67
  - Optimised the price for different golf courses, seasons, weather conditions etc. using a dual annealing algorithm

SAP Labs Bengaluru, India

Research Assistant, Machine Learning *July 2014 - April 2015*

- **Building ML tools to process genomics data for cancer research [R]**
  - Developed a Random Forest classifier for cancer researchers to classify driver & passenger mutations in genomics data
  - Built a feature selector based on mutual information theory and identified 50 most important features
  - Solved the data imbalance problem, achieved an F-score = 0.81 and published a journal article

Honda Cars India Ltd Greater Noida, India

Graduate Engineer Trainee *June 2013 - May 2014*

- **Engine sub-assembly management**
  - Managed Engine sub-assembly for multiple models of Honda cars achieving 10 % reduction in assembly related errors

Additional Projects

- **MIT Solve 2017:** Developed a Internet-of-things & machine learning based solution for reducing chronic disease load in lower income settings and won the finals of the MIT Solve 2017 held at the United Nations.
- **Social Network Behavior Analysis:** Predicted information sharing behavior on social media by developing a model that calculates re-posting probabilities of a post on VK.com using different features achieving 87 % accuracy
- **Crisis image classification:** Developed convolutional neural networks to identify images on social media about people in need for rescue during floods and achived an F-score = 0.83
- **B.E Final Year Project:** Designed the instrument to capture welding fume particles and using ANOVA & regression analysis showed correlation between welding current and Parkinson's causing Mn found by X-ray diffraction
- **Formula Student, Silverstone 2012:** Worked on conceptualisation, design and fabrication of a fully functional medium sized formula race car prototype for participation in Formula Student at Silverstone Race Circuit, UK

Publications

- A. Khare, Q. He, R. Batta, Predicting gasoline shortage during disasters using social media ***OR Spectrum***
- A. Khare, R. Batta, J. Kang On the analysis of last-mile relief over a tree network: Application to 2015 Nepal earthquake ***Journal of Operational Research Society***
- A. Gupta, A. Khare, L. Su, C. Qiao Estimation of Transverse Road Geometry Features Using Crowd-Sourced Data from Smartphones. ***SIGSPATIAL 2020***
- A. Khare, R. Batta, Q. He Improving search for gasoline during a hurricane evacuation event using social media *EURO Journal on Transportation and Logistics*

Conferences

- A. Khare, S. Dong, D. Gammoh, S. Amruth, Dynamic Pricing by combining Xgboost and Dual Annealing (Poster) **INFORMS 2019**
- A. Khare, R. Batta, Q. He, Incorporating Social Media Information in Search Planning: Application On Gasoline Search During Hurricane Irma **INFORMS 2019**
- A. Khare, R. Batta, Q. He, Search and Rescue Operations in Disaster Management using Social Media **IISE 2019**
- A. Khare, R. Batta, J. Kang, The Analysis of Last-Mile Relief Delivery on a Tree Network **POMS 2019**
- A. Khare, Q. He, R. Batta, M.Sabbaghtorkan Predicting Gasoline Shortage in Florida During Irma using Tweets **INFORMS 2018**
- A. Khare, R. Batta, J. Kang A Multi-modal Vehicle Routing Model For Post-disaster Relief Supply In Inaccessible Mountainous Regions **INFORMS 2016**