VISHAL KESWANI
Dual Degree Student, IIT Kanpur

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EDUCATION
*Expected

Indian Institute of Technology, Kanpur	B.S.-M.S. Economics Minor-Machine Learning	10/10 (PG) 8.7/10 (UG)	**Department Rank 1** in MS batch Graduation with **Distinction***	2021*
Kendriya Vidyalaya 1, Ajmer	CBSE (Senior Secondary)	96.4/100	School Rank 1 and **Best Student**	2015
East Point School, Ajmer	RBSE (Secondary)	94.2/100	School Rank 1, 100% in Mathematics	2013

SCHOLASTIC ACHIEVEMENTS

Scholarships and Grants

- One of 2 Economics students in India to receive prestigious research grant of SURGE, IITK (2018)
- Selected for MCM scholarship by SSPC, IIT Kanpur for one academic year (2016-17)
- Received DONOR scholarship by SSPC, IIT Kanpur for the spring semester (2016-17)

Awards

- **Ranked 1st** in FinSim international challenge under FinNLP Workshop on NLP in the FinTech Domain (2020)
- **Stood 1st** in Task A of Memotion Analysis under SemEval International Challenge (on Semantic Evaluation) (2020)
- Earned DeepLearning.AI **TensorFlow Developer Professional Certificate** (Specialization of 4 courses) (2020)
- Received **Commendation Certificate** for excellent performance under SURGE'18 program of IIT Kanpur (2018)
- Bagged the **Best Staff's Pick Project Award** in the course TA201A (Technical Arts) in a batch of 380 (2018)
- Ranked in top **0.5%** in JEE Mains (City Rank 1) & top **1.5%** in JEE Advanced (City Rank 2) among 1.5 mil. (2016)
- Awarded **Certificate of Merit** by **MHRD** and **KVS** for exceptional performance in C.B.S.E. examination (2015)

PUBLICATIONS

Hypernym Detection in the Financial Domain via Context-Free and Contextualized Word Embeddings

FinNLP-2020, 2nd *International Workshop on Financial Technology and NLP, IJCAI-PRICAI 2020*

- Reviewed Bordea et al. (2015), Camacho-Collados and Navigli (2017), Shwartz et al. (2016), Fu et al. (2017) etc
- Used **Word2vec** word-embeddings trained on corpus from scratch and **pre-trained BERT** word-embeddings
- Classified embeddings using distance metrics (L2, L1), cosine-similarity and simple classifiers (Logistic, Naïve Bayes)
- Word2vec with **Naïve Bayes** & BERT with **Logistic Regression** gave best test accuracy of **88%** & mean rank 1.2

Unimodal and Bimodal Sentiment Analysis of Internet Memes

SemEval-2020, 14th *International Workshop on Semantic Evaluation, COLING-2020*

- Explored **Multimodal Machine Learning** for combining CV and NLP (Morency and Baltrusaitis,2017)
- Reviewed Vaswani et al. (2017), Devlin et al. (2019), Oquab (2014), Keila et al. (2019), Qian et al. (2016) etc
- Implemeted **CNN** (image-only) and **FFNN** (text-only), combined using SVM, RF and Neural Network
- Implemented Naïve Bayes (text-only), fine-tuned **BERT** (text-only) & **Multimodal Bitransformer** (text+image)
- Text-only FFNN with Word2vec embeddings performed best, outperforming baseline **Macro-F1** by **63%**

INTERNSHIP PROJECTS

MURATA VIOS | Computer Vision Intern
(May'20-Aug'20)

Computer Vision on Edge devices for the visually impaired using TensorFlow Lite

- Streamlined the pipeline: converting raw images to tfrecords, training, conversion of checkpoints to **tflite** format
- Customized **Object detection** (COCO dataset) and **Face Detection** (Open Images dataset) for Raspberry Pi 4
- Trained quantized **MobileNet V2** on LFW dataset & user faces, obtained **Face Recognition** accuracy upto **93%**
- Linked face detection and recognition systems, used frame-averaging and thresholding for robust predictions

NOKIA SOLUTIONS AND NETWORKS | NLP Intern
(May'19-July'19)

Auto-Suggesting inquiry questions to Care Engineer based on client case

- Extracted e-mail bodies (doc to csv), followed by tokenization, removal of stop words, stemming, lower casing in **nltk**
- Vectorized rows using term frequency-inverse dpocument frequency (tf-idf scores), used to calculate cosine-similarity
- Clustered client queries using **k-means**, for a new query, reported questions corresponding to 3 most similar clusters

SURGE, CSE Department | Research Intern | *Mentor: Dr Nisheeth Srivastava*
(May'18-Dec'18)

Effect of probabilistic sample size on preference behavior via web game

- Designed web experiment using HTML, CSS, JavaScript; simulated bets via **Box-Muller** method & Logistic function
- Made 4 types of trails, computed mean reaction times & performed outlier detection using **IQR** method in MATLAB

KEY PROJECTS

MNIST Classification and Generative Modelling (Jan'20-Apr'20)

Mentor: Dr Vipul Arora, Department of Electrical Engineering, IIT Kanpur
- Reviwed Rezende et al. (2014, 2015), Kobyzev ey al. (2019), Kingma et al. (2015, 2018), Berg et al. (2019)
- Implemented **VAE** with Planar Normalizing Flows to generate MNIST digits, least loss for flow length 8 with K=6
- Implemented **PCA** & **NMF** from scratch, classified MNIST images, NMF gave 80% accuracy on the testset for K=3

Product Recommendation System (Aug'19-Nov'19)

Mentor: Dr Purushottam Kar, Department of Computer Science and Engineering, IIT Kanpur
- Explored different algorithms from the extreme multi-label classification repository (manikvarma.org)
- Reviewed top 3: Prabhu et al., 2018 (Parabel), Jain et al., 2016 (PfastreXML), Prabhu & Varma, 2014 (FastXML)
- Trained the 3 algorithms on a dataset of 10k users, represented by ~16k features, with ~3k labels of interest
- **FastXML** performed overall best with model size **1.42mb**, prec@1 **80.4%**, and prec@3 **49.7%** on the test dataset

Twitter sentiment analysis of 'Tradewar' tweets (Aug'19-Nov'19)

Mentor: Dr Somesh Mathur, Department of Economic Sciences, IIT Kanpur
- Reviewed Medhat, Hassan, & Korashy (2014), O'Connor et al. (2010), Bermingham & Smeaton (2011) etc
- Extracted twitter data (10m tweets) filtered by keyword 'tradewar' from Jan 2018 (beginning of US-China tradewar)
- Trained Naive Bayes, Maximum Entropy & Decision Tree; NB gave the best accuracy (74%) & training time
- Aggregated polarity scores (probabilities) to get daily trend, hence, constructed a subjective proxy for policy decisions

ARIMA vs LSTM: Time Series Forecasting (Jan'19-Apr'19)

Dr Deep Mukherji, Department of Economic Sciences, IIT Kanpur
- Reviewed econometrics vs deep learning models: Ahmed et al. (2010), Siami-Namini et al.(2018), Brownlee (2016-17)
- Obtained seasonally adjusted real US GDP (quarterly), used **9:1 split** with walk-forward validation (rolling forecasts)
- Used 9:1 train-test split due to high prediction time and used walk-forward validation (rolling forecasts)
- Used MSE for tuning and model evaluation, **ARIMA(1,1,1)** performed best among the econometric models
- **LSTM** showed **23%** reduction in test MSE with 2 neurons and **18%** with just 1 just neuron (batch-size-1, epochs-10)

RESEARCH ACTIVITIES

- Presented paper in the 2nd International Workshop on Financial Technology and NLP, IJCAI-PRICAI (2020)
- Attended the Articial Intelligence for Narratives Workshop, IJCAI-PRICAI (2020)
- Reviewer in the 14th International Workshop on Semantic Evaluation, COLING (2020)
- Presented poster in Students-Undergraduate Research and Graduate Excellence Program, IIT Kanpur (2018)

RELEVANT SKILLS & COURSES

Programming: Python, R, C, C++, HTML, CSS, JavaScript | **Others:** SQL, Bash, Linux, Windows, MS Office, Latex
Familiar Python Packages: TensorFlow, Pytorch, Pm4Py, NumPy, Pandas, Nltk, Keras, TextBlob, ScikitLearn

Natural Language Processing	Probability and Statistics	Bayesian Econometrics	Fundamentals of Computing
ML for Signal Processing	Linear Algebra	Financial Econometrics	Data Structures & Algorithms
Intro to Machine Learning	Real Analysis & Calculus	Stochastic Processes	Principles of Database Systems
Econometrics I and II	Psychology of Language	Social Cognition	Philosophy of Cognitive Science

EXTRA-CURRICULAR ACTIVITIES

Positions of Responsibility	• **Company Coordinator, Student Placement Office** Ensured smooth conduction of PPTs, GDs, invigilated during tests, interacted with company officials • **Senior Executive, Media & Publicity, Entrepreneurship Cell** Aided in organization of eSummit and TEDx, created articles & posts for online media for promotion • **Secretary, Fine Arts Club and Ritambhara** Co-organied ArtFest, Freshers' Night, Workshops and various fashion events during Antaragni 2017
Leadership	• Became **School Captain**, represented school in events and assembly and implemented rules • **Captained School Cricket Team** and won Fair-Play award in an open cricket tournament
Communication	• Secured 1st **position** in British Parliamentary Debate in Galaxy (Inter-pool cultural fest of IITK) • **Anchored** in the department Freshers' Night, also performed speed art in batch Freshers' night • **Best Speaker** from region in Youth Parliament Competition, Zonal level (5 zones in India) • Stood in **top 150** in Tata Building India Essay Competition among 2 million participants twice