Varun Khare

Undergraduate Computer Science

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ACADEMIC DETAILS

Examination	Institute	Year	CPI/%
Computer Science and Engineering	IIT Kanpur	2015-present	9.0
Class XII	Delhi Public School, Bhopal	2015	93.8
Class X	Delhi Public School, Bhopal	2013	10.0

Relevant Courses:

Computational Cognitive Science	Stochastic Processes	Discrete Mathematics
Bayesian Machine Learning	Introduction to Machine learning	Data Structures and Algorithms
Learning Theory	Probability and Statistics	Theory of Computation

HONORS AND AWARDS

Fellowships	National Talent Search Examination (**NTSE**), 2013	Government of India
	KVPY scholar, 2014	Government of India
Awards	Selected in **Top 15 teams worldwide**, Hack against Hunger(2018)	United Nations
	Academic Excellence Award, 2015-2016	IIT Kanpur
	All-India Rank **40** amongst 1.5 million students	IIT-MAINS, 2015
	All-India Rank **192** amongst 150k students	IIT-JEE, 2015
	Scholarship (Complete fee-waiver) 2013	DPS Bhopal

FIELDS OF INTEREST

- Neuroscience, Cognitive Sciences , Meta-Learning and psychology
- Augmented reality, 3D computer vision , Analysis of learning algorithms, Probabilistic modelling

WORK EXPERIENCE

- **Visiting Research Scholar** (National University Singapore)
  (Guide: Prof. Tat Seng Chua, May'18 - July'18)
  - **Objective** : 3D scene manipulation for Augmented Reality Systems
  - Proposed a novel end-to-end architecture consisting of two modules for robust pose prediction and classification based on **2.5 D sketches** proposed in **Marr's theory of vision**
  - One sub module learns to **reconstruct 3D model** in its canonical viewpoint via **multi-task learning DNN**s.
  - Another NN sub module uses **Faster R-CNN** style anchor boxes to predict the **6 DoF** poses in **continuous domain** which **outperforms** PnP based solvers due to robust multi-class classification of 3D objects
  - Also implemented texture mapping from image to corresponding aligned 3D model
- **Software Lead** (New York Office, IIT Kanpur)
  (Guide: Prof. Manindra Agarwal, May'16 - May'18)
  - **Objective** : Industrial grade development of ML backend and android application for NYO
  - **ML systems**: Collaborative Filtering for **Recommendation engine**; document clustering and ranking for **query-search**
  - **Android app**: REST APIs, SSE notifications, app-caching, Continuous integration with Jenkins, **data and property binding** and app designing
  - Lead a team of 16 people at NYO.

MAJOR PROJECTS

- **Zero-Shot Learning Framework** (Under Graduate Project)
  (Guide: Prof. Piyush Rai, Jan'18 - present)
  - Currently the **best generative framework** proposed in ZSL.

- Extended the framework published in ECML paper | *link* to provide a unified generalization for language, vision and other domains.
- Reformulated the Bayesian model to incorporate neural networks for **simultaneous feature learning** and **clustering** making an end to end learning framework
- Results better than current **SOTA** and expecting to publish our results in 2019.

- **Adversarial Corruption in deep Neural Networks**
  (Guide: Prof. Purushottam Kar, Jan'18 - April'18)
  - **Objective** : Provide a adversarial corruption factor for robustly training neural networks
  - Proposed an **alternating optimization** algorithm for the single layer Relu activated neural network. Converted the optimization problem to a **difference of convex functions** for robust optimization.
  - Practically compared the training procedure to SGD as a proof of concept.
  - Literature survey included robust statistics, convergence analysis of two layer network and various convergence proof techniques amongst others.
  - **Project Report:** *here*

- **Concept-Graph based Word Problem solver** (Under Graduate Project)
  (Guide: Prof. Arnab Bhattacharya & Prof. Amay Karkare, July'17 - Dec'17)
  - **Objective** : Creating a word problem solver for elementary speed, distance and time maths problems
  - Generated **world concept graph** depicting **object-quantity** (like subject and distance) owner-ships, **value-quantity** associations (like 20kmph-speed) and reltionships between subjects. Used **DFS** to traverse the graph and evaluate the answer for query.
  - Implemented the model using word2vec, **co-reference resolution**, **syntactic parsing** and **dependency parsing**
  - **Github**: github.com/varunkhare1234/word_problem_solver

- **Augmented Reality Navigation** (Programming Club Project)
  (Guide: Self, May'16 - June'16)
  - Created **Android** navigation app using Google Directions API and **unity3d game engine**.
  - Relayed unity graphics on camera feed according to accelerometer and gyroscope readings. GPS and magnetic compass was used to detect roads.
  - Awarded **best club project** | : varunkhare1234/augmented-reality-app

- **Other Projects**
  - Mentored **Depression Therapy Chat bot** as Programming Club project. Students implemented Sentiment Analysis using twitter data-set for user response classification. The model responded according a dialogue tree based on the sentiment predicted. Classified in **Most innovative student activities** by IITK Newsletter.
  - Android application development for Antaragni 2016 | Mechanical Coin sorter as Technical Arts project.

TECHNICAL SKILLS

Languages	**Proficient**: Kotlin,C,C++, Java, Matlab/Octave, Bash, python, MySQL, LaTeX **Experienced**:R, Verilog, Assembly, C#, HTML
Softwares	**OS**: ARCH linux, Ubuntu, Windows **Libraries and Softwares**: Tensorflow, Pytorch, Android Studio, blender, Unity game engine

POSITION OF RESPONSIBILITY

Course Project Mentor	*Introduction To Machine Learning(CS771), IITK*	*(June'18-Nov'18)*
Coordinator	*Programming Club, IIT Kanpur*	*(May'17-March'18)*
Coordinator	*Google Developers Group*	*(May'16-April'17)*
Manager	*Software Corner, Techkriti 2017 (Annual Tech Fest)*	*(May'16-April'17)*
Student Guide	*Counselling service, IIT Kanpur*	*(June'16-April'17)*
Academic Mentor	*Counselling service, IIT Kanpur*	*(June'16-April'17)*
Senior Web Executive	*Antaragni 2016 (Annual Cult Fest)*	*(May'16-Nov'16)*
Senior Executive	*Entrepreneurship Cell, IIT Kanpur*	*(June'16-April'17)*
Secretary	*Programming Club, IIT Kanpur*	*(June'16-April'17)*