

# Akshay Khare

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## Education

### Indian Institute of Technology Madras (IIT Madras)

Interdisciplinary Dual Degree with M.Tech. in Data Science and B.Tech. in Ocean Engineering

2015-2020

Chennai, India

GPA: 9.30/10

- Ranked **first** in the undergraduate department at IIT Madras. Recipient of three **awards** for academic excellence.
- Among top 25 students selected to pursue the interdisciplinary dual degree programme in **Data Science** from a batch of 800+ undergraduates

## Publications

Phil Scarf, **Akshay Khare**, Naif Alotaibi, "[On skill and chance in sport](#)", *IMA Journal of Management Mathematics*, Volume 33, Issue 1, January 2022, Pages 53–73, Oxford University Press

## Experience

### Industry

#### Machine Learning Engineer, Maverick Quantum (mavQ)

Jun. 2022 - present

#### Machine Learning Engineer, MTX Group

Aug. 2020 - May 2022

Member of Innovation Team. mavQ is an independent AI company launched by MTX Group

Hyderabad, India

- Researched and developed a novel **transformer** architecture that learns rich visual, textual and layout feature representations for information extraction from documents
- Improvised and trained one-stage **object detectors** to detect players in sports videos with  $AP_{50}$  score of 96.6%; worked on person re-identification based **object tracking** to track players and contributed to production deployment of the entire system
- Built a pipeline to extract player trajectories from non-stationary camera videos by employing template matching and homography
- Led the development of a virtual jersey try-on application for FC Dallas, a leading **professional soccer club** in the United States
- Developed an approach to identify the type of scoring in basketball videos with an F1-score of 90.2% by utilizing **pose estimation**

## Research

### Learning Multiple Diverse Classifiers for Adapting to Label-Dependent Distribution Shift

Aug. 2019 - May 2020

Dual Degree Project, IIT Madras — Advisor: [Prof. Harish G. Ramaswamy](#), Dept. of Computer Science

Chennai, India

- Worked on a novel approach to **domain adaptation**, that does not require data from test domain, and involves simultaneously training multiple performant classifiers while introducing diversity among them
- Formulated a variety of **new loss functions** that promote orthogonality among linear classifiers as a way of introducing diversity; achieved a performance improvement as high as 25% over training a single classifier for certain types of biases in the training data
- Experimented with multiple ways of constraining the convolutional filter weights for training multiple diverse CNNs

### Statistical Modelling in Sports

May 2019 - Jul. 2019

Research Assistant, University of Salford, UK — Advisor: [Prof. Philip Scarf](#)

Manchester, UK

- Developed a wide variety of parametric statistical models for predicting Australian Football League scores by proposing 6 novel formulations for incorporating team attack and defense strengths, home advantage and score dependence
- Estimated parameters by maximizing discounted log-likelihood; achieved one-month-ahead result forecasting accuracy of 69%
- Devised a game simulation model to generate visualizations for the evolution of teams' win probability over the duration of a match as a way to qualitatively assess outcome uncertainty for varying scoring rates
- **Published a paper** that proposes a broad framework to study and outcome uncertainty across a wide range of sports

## Internships

### Computer Vision Intern, Oneirix Labs

Dec. 2018 - Jan. 2019

Winter Internship in Computer Vision

Pune, India

- Performed real-time object detection of vehicles in CCTV video footage and devised an image similarity metric using a combination of color histogram and HOG features for tracking the vehicle of interest
- Developed a framework to obtain the distribution of vehicles idling at traffic signals to design smart traffic management strategies

### Data Science Intern, Cytel Statistical Softwares & Services

May 2018 - Jul. 2018

Summer Internship in Machine Learning

Pune, India

- Preprocessed customer support email text data using NLP techniques like stop-words removal, lemmatization and POS tagging
- Built a bag-of-words model and utilized the TF-IDF scheme to extract words with high discriminatory power
- Achieved content-based email classification with an F-1 score of 92.2% for improved efficiency of customer support

## Curricular Projects

### Sequence-to-Sequence Modeling for Text Transliteration

Mar. 2019

Course: *Deep Learning*

IIT Madras

- Developed a sequence-to-sequence model using encoder-decoder architecture with bi-directional LSTM in Tensorflow
- Implemented multiple regularization measures and achieved 88.65% accuracy in English to Hindi transliteration

### Face Verification Classifier

Oct. 2018

Course: *Data Analytics Lab*

IIT Madras

- Performed face detection using Haar Cascades and employed mean thresholding for adapting to varying illumination conditions
- Trained SVM classifier on eigenfaces features to verify if a pair of faces belongs to the same person achieving 94.2% F-1 score

### Product Analytics in Retail Banking

Mar. 2018

Course: *Decision Models*

IIT Madras

- Performed customer segmentation by employing cluster analysis on customers' profit score and response probability
- Formulated and solved a constrained integer linear programming problem to maximize profit for segmented customers

## Relevant Academic Coursework

- **Machine Learning:** Deep Learning, Introduction to Data Analytics (Machine Learning), Data Analytics Lab, Big Data Lab
- **Probability and Statistics:** Probability, Statistics and Stochastic Processes, Decision Models, Mathematical Foundations of Data Science, Statistical Design and Analysis of Experiments
- **Mathematics:** Linear Algebra, Optimization, Operations Research, Mathematical Finance, Functions of Several Variables (Multivariate Calculus), Series and Matrices, Differential Equations
- **Online Certifications:** Machine Learning Engineering for Production (MLOps)

## Skills and Tools

- **Programming Languages and Tools:** Python, R, C, Git, Docker,  $\LaTeX$
- **Machine Learning Tools:** PyTorch, Keras, TensorFlow, OpenCV, scikit-learn, NumPy, Pandas, Matplotlib, Flask, MLflow

## Academic Achievements

### Goodearth Shipbuilding Pvt Ltd Prize

Oct. 2020

Convocation Ceremony, IIT Madras

Chennai, India

Awarded a **medal for the best academic performance** in the academic years 2015-2020 among undergraduate department graduands

### Institute Merit Prize

Apr. 2019

Institute Day, IIT Madras

Chennai, India

Awarded a **medal for securing highest grades** in the academic year 2017-2018 in the undergraduate department batch

### Ms. Latha and Sampath Srinath Prize

Apr. 2018

Institute Day, IIT Madras

Chennai, India

Awarded a **medal for securing highest grades** in the academic year 2016-2017 in the undergraduate department batch

## Services and Extracurricular Activities

### Technical Reviewer

Aug. 2019 - Sep. 2019

Book: *The Python Workshop*, Packt Publications

- Technically scrutinised and provided feedback on the accuracy, relevance, and clarity of the book's content on Python programming, particularly for machine learning applications

### Technical Content Creator

Mar. 2020 - Apr. 2020

Book: *The Data Wrangling Workshop*, Packt Publications

- Designed 130 multiple-choice questions intended for specific learning outcomes in a wide range of topics in Python programming

### Academic Mentor

Aug. 2017 - Nov. 2017

Academic Buddy Programme, IIT Madras

- Conducted doubt resolving sessions and remedial lessons for a student finding it difficult to cope with academics at IIT Madras
- Assisted the struggling student in clearing **2 out of 3** backlog courses by providing counselling and guidance

### Representative for Project Germinate

Aug. 2016 - Apr. 2017

National Service Scheme, IIT Madras

- Represented an initiative to spread awareness about protecting trees; managed 5 volunteers and assisted in tree plantation efforts