# Himanshu Ahuja

Cognitive Machine Intelligence Researcher, focused on Vision and Language perception.

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## EDUCATION

*2015-2019 (Expected)*

**Delhi Technological University (Formerly DCE), New Delhi**

Bachelor in Technology, Computer Science & Engineering, CGPA 9.01/10

**Featured Coursework:** Computer Vision, Artificial Intelligence, Data Structures, Simulation & Modelling, Pattern Recognition, Swarm Intelligence

## RESEARCH AND WORK EXPERIENCE

*Jun'18-Present*

**Summer Intern & Research Scholar**

Institute of Pure and Applied Mathematics, UCLA and Praedicat Inc.
(Supervisors: Dr. Stephen DeSalvo, Shadi Shahsavari)

- Building a **Positive feedback loop** for automating information extraction and analysis.
- Performing **data credibility inference** through a **Logic-based knowledge graph.**
- Built **crawling & parsing** solution, **data management** software and **RDF Databases**.

*May'18-Jun'18*

**Development and Research Assistant in Vision**

Indian Institute of Technology, Delhi (Supervisor: Dr. Tapan K. Gandhi)

- Developed an iOS Application to **track saccadic movement of the eyes** using **CSRT**.
- **Tested and experimented** eye movement patterns in **onset vision patients**.
- **Extending the patterns** observed to **neural architectures**.

*Aug'17-Jan'18*

**Research Assistant in Visual Tracking**

Defense Research & Development Organization, (Supervisor: Dr. Gurjit S. Walia)

- Built a novel single object tracking architecture using **fusion of HOG, LBP and Intensity feature descriptors based on a self-developed fusion strategy.**
- The architecture also contained a novel updating strategy based on an **outlier detection mechanism (based on Tree Bagging) and fuzzy decision model (Multi-class SVM)**.
- We tested various fusion methodologies, performance of previously proposed object tracking frameworks and **optimized proposed tracker on 20 CVPR 2013 benchmark sequences.**

*Jun'17-Oct'17*

**Research Assistant in Natural Language Processing**

Delhi Technological University, (Supervisor: Dr. Akshi Kumar)

- Designed a **recommender system for Microblogging platforms** like Twitter.
- The recommender system utilized the **distributed representation and the external features of the microblogs**.
- The project introduced the novel concept of **latent support vectors in the PMF Matrix** that **assisted the recommendation system during cold start and sparse systems.**

## PUBLICATIONS

*Under Review, IEEE Transactions on Cybernetics*

**Unified Graph based Multi-Cue Feature Fusion for Robust Visual Tracking**

Visual Tracking | Adaptive Appearance Model | Feature Fusion | Outlier Detection

*CCPE Wiley'18, Accepted*

**Supported Matrix Factorization using Distributed Representations for Personalized Recommendations on Twitter**

Distributed Representation | Recurrent Neural Networks | Probabilistic Matrix Factorization

*Springer ICDIS'17 Advances in Data and Information Sciences, pp 105-115*

**Breast Cancer Detection using Low-Computation based Collaborative Forward Dependent Neural Networks:** *(DOI: 10.1007/978-981-13-0277-0_9)*

Computer Aided Diagnosis | Breast Cancer Detection | Neural Network Ensembling

*IEEE 4th ICIIECS'17*

**Detection of Malicious Transactions in Database using Dynamic Sensitivity and Weight Rule Mining:** *(DOI: 10.1109/ICIIECS.2017.8276084)*

Database Intrusion Detection | Role Based Access Control | Weighted Association Rule Mining

## ACADEMIC PROJECTS

*Feb'18-Present* — **Replication of Brain perception capabilities based on time-based topological model and hierarchal temporal learning.**

- **Developing theoretical models** to eliminate the **foundational flaws in deep neural nets**.
- **Extending HTM algorithms** to overcome the issue of incremental learning.

*June'17-July'17* — **News Interest Modelling using word2vec (Data Scraping & Natural Language Processing):** *(github.com/babahooja/AI-to-News-in-Shorts)*

- Developed a ***chrome extension*** for measuring user activity on news articles, in ***PostgreSQL***.
- Feature vector construction of topical-words & ***word2vec in Python*** for finding similar articles.
- Used ***PySpark*** to generate article embeddings on EC2, for millions of news articles to mine user activity patterns.

*March'17* — **Blind Navigation System using Stereo Imaging (Computer Vision):** *(github.com/babahooja/Blind-Navigation-System)*

- Modelled an in-house stereo camera using phone cameras, ***calibrated in MATLAB***.
- Constructed real-time ***disparity maps for determining obstacle proximity*** in each frame analyzed in ***Python OpenCV***.

*February'17* — **Smart City Electricity Grid Cost Management (Neural Networks for Usage Optimization):** *(github.com/babahooja/Tata-Smart-Grid-Hackathon-2017)*

- Developed a prediction system for ***dynamic costing of electricity*** using a greedy algorithm.
- Developed a simple ***neural network for bill prediction*** in smart homes for cost-optimization.

*December'16* — **Air Quality Prediction System (Decision Modelling and Data Acquisition):** *(github.com/babahooja/CleanAirAsia-Hackathon)*

- A ***regression-based prediction system*** to predict the AQI values given a few AQI monitors.
- A ***pair-wise training model***, where the parameters deciding AQI values of one monitor are optimized by the AQI values of the other monitors in the nearby region.

## TECHNICAL SKILLS

***Programming:*** Python, C/C++, MATLAB ***Databases:*** MySQL, Postgres, PLSQL, SPARQL ***Web-Dev:*** Django, HTML/ CSS, PHP
***Machine Learning:*** PyTorch, OpenCV, TensorFlow, Sci-Kit, Numpy, Pandas ***Other:*** AWS EC2 and S3, Selenium, RDF4Jm, Git

## LEADERSHIP POSITIONS

*Aug'17-Present* — **Founder & President,** Hinton Learning Group, a College SIG on Deep Learning
*Aug'15-Dec'16* — **Actor & Writer,** Pratibimb, Theatre Society of Delhi Technological University
*Aug'14-June'15* — **Head of Student Union,** Bal Bharati Public School, Dwarka
*April'13-June'15* — **Sargent at Arms,** School Rotary Interact Club, Rotary International
*July'13-Oct'14* — **Student Head,** Delhi, Teach for India Campaign
*April'13-May'14* — **Ambassador for Delhi,** Kids for Tigers, Sanctuary Asia

## AWARDS & ACADEMIC HONORS

*Smart India Hackathon'17* — **Winner** (among 5000 selected teams all over India)
*Tata Power ISGF Hacks'17* — **Special Prize for Innovation,** (among 200 teams all over India)
*Clean Air Asia Hack'16* — **Winner,** prototype used by Clean Air Asia Foundation for their application.
*JEE Mains'15* — **All India Rank 1789** (among 1,50,000 students)
*NIE Times of India'14* — **Student of the year,** (among all CBSE affiliated schools in India)
*State Declamation'13* — **Winner,** (Delhi State)
*International Mathematics Olympiad, SOF'10* — **Rank 1,** (among 15,000 candidates)
*Junior Science Talent Search Exam, DoE'12* — **Rank 18,** (among 1,00,000 candidates)