

Ashwani Kumar

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ACADEMIC DETAILS

Degree	Year	Institution	Grade/Percentage
B.tech	2016-2021	Indian Institute of Technology, Kanpur	58%
12th	2015	DAV College	88.60%
10th	2013	DAV COLlege	83.80%

SCHOLASTIC ACHIEVEMENTS

- Selected for INSPIRE scholarship, awarded to the top **1%** among **5.3lakh** students by Department of Science & Technology.
- 2nd Position** in Aviation Development Competition 2019 at IIT Kanpur.

KEY PROJECTS AND INTERNSHIP

- **Field Inversion and Machine Learning** *BTP supervision: Dr. Rajesh Ranjan* Apr'21-'July21
 - Used Field Inversion Method then applied Machine Learning to improve the CFD model. Used 2-Equation **K-omega model**
 - Used **tanh clustering** for meshing, applied central finite difference method to get the second derivatives.
 - Used under Relaxation method to Evaluate Linear Equation the K and Omega correction equations.
 - MSE loss function for Field Inversion and Used **Bolt Drive Method** for Optimization and Used Discrete Adjoint method to calculate derivatives of loss function.
 - Designed 3 Neural Networks and Machine leaning model and compare their performance.
- **Image Processing** *(Self Project)* Jan'21-Aug'21
 - Brain MRI Segmentation** Used Kaggle Public lgg segmentation dataset. The dataset had only 4k images, used Keras in built IDG for augmentation. Built a small unet with 31million parameters. used custom loss functions Dice Coefficients and Jaccard index. Final model trained for 30 epochs had **size of 335MB** and **0.98,0.97 binary, 0.75,0.72 IOU, 0.82,0.85 Dice accuracy** on training and validation sets. Model had **0.85, 0.67, 0.71 accuracy on test set** respectively
 - Intel Image Classification** Used Intel Image Classification Dataset on kaggle. Dataset has 14k images. Created a smaller subset of dataset and Used Keras in built IDG for smooth training. Built model with **0.3 million parameters**. Model trained for 30 epochs had accuracy of **0.94 on training, 0.89 on val set and 0.79 on test set**
 - Face Swap** Used Pre-trained model to detect Landmarks on Face. Used Delaunay Triangulation to create mesh then used affine transformation to transform the landmark points. in the end used Seamless cloning.
- **Toxic Comment Classification** *(Self Project(Kaggle Competition))* May'20-'July20
 - Competition was to build a model which recognizes toxicity with imbalance dataset.
 - Built a new balanced dataset of all six classes, Performed visualization and correlation test, applied Cleaning, lexicon normalization and stopword removal.
 - Used TF-IDF unigram, bigram and trigram model for word embeddings.
 - Trained LogReg(0.91), KNN(0.66), BNB(0.76), MNB(0.87), SVM(0.91), Random Forest(0.91) with average accuracy on training data.**
 - Built LSTM model for further improvement. used Keras embedding and 1 Layer of LSTM with 2 million parameters gave **accuracy of 0.97 on training data**. Future models: Bi-LSTM model, LSTM with Attention and Transformer architecture.
- **The Battle of Neighbourhood** *(Coursera Course Project)* Jan'20-Apr'20
 - Developed a Model to compare the Geo-location of two location by using foursquare api.
 - Scrapped data from Wikipedia using Beautiful soap. Converted HTML postal code as Data-frame.
 - used Geocoder to get Longitude and latitude.Used Foursquare API to get the Data of the neighbourhood of the specific Location.
 - Applied K-Means Clustering algorithm to Compare the similarity between to Location.
- **Helicopter Coupled Trim Analysis** *(Course Project AE:686)* Aug'19-Dec'19
 - Developed the coupled trim analysis code for data pertaining to UH-60A Black Hawk helicopter.
 - Developed codes on MATLAB to predict the aerodynamic performance of blade under different conditions.
 - Implemented various numerical methods six-point Gaussian Quadrature, **Newmark's Algorithm**.
 - Numerically solved the blade flap equation and calculated all the blade hub shear forces and moments in the rotating frame of reference as a function of azimuth angle.
- **Design and Modelling Internship** May'18-July'18
VTOL Aviation India Pvt Ltd.
 - Worked as a part of Propulsion Team Analyzed the Rotor Performance to achieve **optimal Power Consumption of India's First AirTaxi(900kg)**, also worked on landing gear of 50kg UAV.
 - Developed simulation codes on MATLAB Using **BEMT** to predict the Performance parameters of the rotor.
 - Developed Codes on Visual C++ Using Lab-View to test the sensors of Test-Bench of The Bird.
- **Solid Propellant Rocket and Parachute** *(Course Project AE:461)* Jan'19-Apr'19
 - Developed CAD model of the prototype and used it to obtain 3-D printed structure.
 - Used **C6-3 solid Propellant Engine** and Successfully launched the rocket to a height more than 150m with **in-line parachute ejection deployment**.

- **Other Self Projects**
 - **Housing Price Prediction Simon Game(Web), TicTacToe(Web), Pong Game(Python), Snake Game(python and Web)**

TECHNICAL SKILLS AND TOOLS

- **Languages** :C++, JAVA, HTML5, Matlab, **Python**, SQL, JS, CSS, Octave.
- **Tools and Skills** : Auto-desk, Machine Learning, NLP, Deep Learning, AWS, Web Dev(Front), Git, Web Scrapping.

RELEVANT COURSES

- **Institute Courses:** Fundamentals of Computing, **Linear Algebra, Finite Element Method**, Aircraft Propulsion, **Thermodynamics**, Optimal Space Flight Control, Modern Control System, Signal Processing, Rocket Propulsion. Helicopter dynamics
- **Online Courses** Machine Learning, **IBM Data Science, Deep Learning Specialization**, Complete Web Development, Python Code challenge.

EXTRA-CURRICULAR

- Mentored Students of Various Colleges in **Boeing National Aeromodelling Festival'17**
- Participated in Techniti17 Aeromodelling Competitiont 'Sky Sparks'.
- Volunteered in Shiksha campaign to provide education to 6th-12th and JEE Mains Students.
- Volunteered in the National Service Scheme to provide education to underprivileged children in school.