Vikas Kumar

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Academic Detail

2013-2015	MSc - **Mechanical Engineering** CGPA **3.63/4**.	**Masdar Institute of Science and Technology,** Abu Dhabi, in **Collaboration with Massachusetts Institute of Technology**
2005-2009	B.Tech. - **Mechanical Engineering** CGPA **7.74/10**.	**National Institute of Technology,** Kurukshetra

Work Experience

July'18-Present Data Scientist **Infrrd.ai**
Bangalore, India.

- Working on intelligent Data Capture team, Created ML architecture for training and testing loop for document information extraction from scratch to augment existing rule based system.
- Object Detection on document images using CNN based models.
- Document classifier based on various fine level features.
- Working on ML models to augment existing rule based system.
- Deployed, Multiple ML model on AWS EC2 instance.

Mar'18-Apr'18 Data Scientist **NanoPrecise Sci Corp**
Bangalore, India.

- Condition monitoring of Plant Asset.
- Created dashboard and deployed machine learning model using Shiny R server, AWS EC2 Instance.
- Signal processing of vibration acceleration data.

May'17-Feb'18 Data Scientist **Tata Group Technology Innovation Office,**
Factory and Fleet Analytics Team **Bangalore, India.**

- Identifying the correct data required for solving a business problem.
- Cleaning and pre-processing the dataset to appropriate format for predictive models.
- Exploratory data analysis, to figure out important features for machine learning.
- Creating appropriate training, test, and validation set for training the model.
- Understanding the issues of underfitting, overfitting, out of sample errors.
- Most of our datasets are of the order from 1MB to 10 GB, I use R and python for all the modelling purposes. Library used are R: caret, H2O, ggplot2 etc. Python: Numpy, Pandas, matplotlib, Keras etc.
- Flisom's Thin Film manufacturing process problem: to figure out the cause of inconsistency in module efficiencies by using machine learning technique on process data.
- Boiler tube leak detection using principal component analysis and exponentially weighted moving average.
- Coal Blend (nonlinear mixture) property prediction using Machine Learning Techniques.

Sept'15-Jan'17 Project Associate **Indian Institute of Science,**
Bangalore, India.

- Solar concentrator and receiver optimisation (**Monte Carlo Simulation)** for supercritical CO_2 loop in Solar Energy Research Institute for India and the United States (SERIIUS) project.

Aug'13-Jul'15 Research Assistant **Masdar Institute of Science and Technology (Abu Dhabi, UAE)**
In **Collaboration with Massachusetts Institute of Technology**.

- Courses: **Advanced Engineering Mathematics**, **Estimation and Inference from Data and Models**
- Optical modelling of a 100 kWth beam-down pilot plant for **MI-MIT** flagship project **CSPonD**.
- **http://web.mit.edu/mit-mi-cp/research/projects/flagship07.html**, **http://www.sciencedirect.com/science/article/pii/S1876610215011273**, **http://scitation.aip.org/content/aip/proceeding/aipcp/10.1063/1.4949031** .
- Used Matlab to create scheme macro for TracePro, which create Heliostat and Central Reflector system geometry, translate and rotate to relevant positions, and perform **Monte Carlo Ray Tracing**.
- Validation of an Optical Model Applied to the Beam Down, using heat flux sensor and charge-coupled device (CCD) camera (image processing).
- Teaching Assistant - Concentrated Solar Power and Thermal Energy Storage

		Global Technology Centre
Dec'10-Aug'13	Calculation Engineer	**Alstom Hydro Research and development India Ltd**, **Vadodara, India**

- Failure Analysis of Pelton turbine and turbine component.
- Combine hydraulic and mechanical analysis for Pelton bucket design optimization.
  Mapping of CFD output pressure to Finite Element Analysis (FEA) model at different time steps.
  Simplified the process of standard data transfer procedure between CFD and FEA.
- Performed analytical calculation for Pelton Scale Model Test Laboratory and Silt Abrasion Laboratory.
- Supported in telemetry torque measurement of pelton scale model for calibration.
  Evaluated strain level for given loading condition through **finite element calculation**.
  Advised change in geometry of pelton bucket holder and helped in choosing right position of strain gauge.
- Developed standardized internal design tool for tendering and design department, which includes
  User Excel interface using VBA and Parametric Model using Ansys Design Modeler (DM).
  Automatic pre-processing, solve and post-processing, generating result files use Mechanical APDL.
  User guide and validation file.
- Supported Alstom India Limited, hydro's design team for calculation of turbine components of ongoing projects with AIL.
  Produced FEA calculation reports of head cover, operating ring and bottom ring, etc. of franics turbine in 2D and 3D approach.

Oct'09-Nov'10	Graduate Engineer Trainee	**Indian Sugar and General Engineering Corporation**, Yamunanagar, India

- Handling all activities pertaining to shop planning which includes planning design detail of the shop and product placement at shelves. Planning and Monitoring of raw material requirements for Production.
- Training in design, marketing, planning, project management, and welding departments.

Key Hands on Projects

- **Project:** Using Radar data(Google's Soli Sensor data) Gesture recognition.
- Using the data used by Deep-Soli,(ETH) trained with time distributed convolution + LSTM model(end to end, using different architecture than paper suggested) to get 90%+ accuracy for various hand gestures.
- Key feature of radar data is that it captures spatiotemporal feature very well, to be able capture that in deep learning model, I used time distributed CNN to extract spatial features and LSTM to extract temporal features.
- **Project:** Video Gesture recognition using only RGB image.
- RGB image frames have spatial information, where object detection is relatively easy task now days, but have temporal memory between inter frame of video is much more difficult.
- Using optical flow data of image, trained model (3D CNN, LSTM) with jester dataset to recognise 6 actions(like swiping right, swiping left etc.)

Programming and Software skills

- Language: **Matlab**, **R**, **Python**, Visual Basic Application (VBA), Scheme, ANSYS Parametric Design Language (APDL),.
- Software: Ansys DesignModeler (DM), Ansys Mechanical and Classic, Fluent, Aspen Plus, TracePro, SolTrace, CatiaV5, SolidWorks, MS Office suite.

Publication and Conference

Benjamin Grange, Vikas Kumar, Antoni Gil, Peter R. Armstrong, and Daniel S. Codd, and Nicolas Calvet "*Preliminary optical, thermal and structural design of a 100 kWth CSPonD beam-down pilot plant*".

- The 7th International Conference on Applied Energy – ICAE2015.

Benjamin Grange, Vikas Kumar, Antoni Gil, Peter R. Armstrong, and Daniel S. Codd, and Nicolas Calvet "*Preliminary optical and thermal design of a 600 kWh direct absorption molten salt receiver/storage system.*".

- Applied Energy Journal – under review.

Vikas Kumar, Peter Armstrong, Miguel Frasquet, Marco Stefancich, Benjamin Grange, Nicolas Calvet
Poster: Optical model of a complex beam down concentrator system using TracePro™.

- SolarPACES Conference 2015

Benjamin Grange, Vikas Kumar, Juliana Beltran Torres, Victor Perez, Peter R. Armstrong, Alexander Slocum, and Nicolas Calvet "*Validation of an Optical Model Applied to the Beam Down CSP Facility at the Masdar Institute Solar Platform.*"

- SolarPACES Conference 2015

Training

- Certified Program in Big Data Analytics and Optimization (6-month In Class Program 2016)
  at International School of Engineering, Bangalore. The program is certified for the quality, pedagogy and assessment by LTI of Carnegie Mellon University.
  Project Work: Predict the Cost of Shipment for a Freight Management Company.
  Techniques Used: Generalized Linear Model, LM, Random Forests, Support Vector Machine.
  Software Environment: R
- Course Statement of Accomplishment in ***Analytics Edge*** *(MIT)* offered by EDX (2016). Which covers logistic/linear regression, Decision Tree/ Random Forest, Clustering, and Linear Programming etc. in ***R***.
- Course Statement of Accomplishment in ***Machine Learning*** *(Stanford)* offered by Coursera (2013). Which covers logistic/linear regression, Neural Network, Clustering, and Support Vector Machine etc. in ***Matlab***.
- Certificate of accomplishment with highest distinction in ***Introduction to Computer Science*** *in* ***Python*** course offered by Udacity (2012).
- Ansys Design Modeler and Ansys Mechanical Introduction by ANSYS (2011).

Extra Curriculum

- Executive Member of "MECH-SOC" official technical Society of the institute for Mechanical Engineering students 2006-2009.
- Student Member of American Society of Mechanical Engineers (ASME) 2008.
- Event Coordinator of "Junkyard Wars" in LITERATI'2009, MAGNUM OPUS'2008(Technical Fest) at NIT, Kurukshetra.
- Member of the organizing committee for the LITERATI '2007 and '2009, MAGNUM OPUS from 06-08.

Accomplishments

- 1st Prize in "JUNKYARD WARS" Contest at National Level Technical Fest "Tryst'08" at **Indian Institutes of Technology, Delhi** for designing and fabricating a human powered vehicle with weight carrying capacity by using available junk.
- 2nd prize in "JUNKYARD WARS" MAGNUM OPUS '07 at **NIT, Kurukshetra**.
- 4th prize in "Gearloose" in a National Level Technical Fest "TECHKRITI '08" at **IIT, Kanpur**.
- Full scholarship to attend the Masdar Institute of Science and Technology (2013-15).