

# Pradeep Singh

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## EDUCATION

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- **San Diego State University** San Diego, CA  
*Master of Science in Computational Data Science; GPA: 3.70/4.0* *Aug. 2017 – May. 2020*
  - **Thesis:** Neural Mechanism for Target (Object) Tracking in Visual System
  - **Publication:** Models for Propagating Facilitation in Visual System. Accepted in ICIV, 2019
  - **Courses:** Machine Learning, Deep Learning, Numerical Optimization, Statistical Inference, Parallel Computing.
- **University of Mumbai** Mumbai, India  
*Bachelor of Engineering in Electronics and Telecommunication; GPA: 3.2* *Aug. 2011 – July. 2015*

## TECHNICAL SKILLS

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**Languages/Libraries:** Python (Numpy, Scipy, Pandas, Matplotlib), C/C++, MATLAB, PySpark, SQL

**Machine Learning:** TensorFlow, Keras, Scikit-learn, MLlib

**AWS:** Storage (S3), Computing (EC2, EMR), Amazon SageMaker

**Tools:** Git, Docker, Gitlab, Flask

## EXPERIENCE

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- **Dassault Systemes** Boston, MA  
*Machine Learning Research Intern – [Paper], [Poster]* *June 2019 - Dec 2019*
  - **Deep Learning for CFD:** Researched and proposed novel deep learning (CNNs) based solutions for accelerating CFD simulations.
  - **Deep Learning for Unstructured Mesh:** Researched and explored deep learning approaches for unstructured data. Proposed models for super resolution on unstructured mesh (by converting meshes into graphs).
  - **SRCFD:** Developed SRCFD, a generalized and platform agnostic framework using TensorFlow, that can super resolve coarse simulations into fine simulations.
  - **Python Package:** Developed Python package to (automate) generate, extract, process and convert (unstructured and structured) mesh data to graph data and vice-versa.
  - **Data set:** Delivered in-house dataset of low resolution and high resolution simulations.
  - **Platform:** Built custom docker images and containers to containerize ML models.
  - **Tools Used:** Python stack (NumPy, SciPy, Matplotlib), TensorFlow, PyMesh, PyVTK, Docker, AMD GPU.
- **Computational Science Research Center, SDSU** San Diego, CA  
*Graduate Research Assistant – [Thesis], [Thesis Codebase]* *Aug 2017 - May 2020*
  - **Research:** Researched Neural mechanisms (response facilitation) for target (object) tracking in visual system.
  - **Modeling:** Built computational models of neurons and (networks) astrocyte in Matlab.
  - **Simulation:** Simulated models of facilitation, calcium waves, calcium pumps, in biological cells.
  - **Analysis:** Analyzed gigabytes of data in Matlab. Carried out comprehensive parametric study of our models.
  - **Results:** Poster accepted in ICIV, 2019. One journal paper (in-progress)

## PROJECTS

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- **Visual Recognition using CNNs**  
*Built a Image Recognition Web App using Flask – [Report], [Code]*
  - **Classification:** Built Image classification system using Convolutional neural networks in Tensorflow (and Keras) to classify given image into different classes. Dataset used ImageNet, Fashion MNIST, MNIST.
  - Designed architectures like VGG, ResNet, MobileNet. Achieved accuracy of 95% with VGG model.
  - Improved the performance by using techniques like data augmentation, transfer learning and batch normalization. Build and deployed Flask web app to serve model in real time.
  - **Object Detection:** Built Object detection model YOLO in TensorFlow for detecting objects in Images.

- **Increasing the Resolution of Images**

- *Image Super Resolution using Deep Learning – [Code]*

- Implemented SOTA Image super-resolution research papers – SRCNN, FSRCNN, ESPCN, SRGAN, EDSR and WDSR in TensorFlow. Explored approaches like adversarial training, sub-pixel convolution.

- **Autoencoders**

- *Survey project on family of Autoencoders – [Report], [Code]*

- Implemented different forms of Autoencoders: Sparse, Denoise, Contractive and Variational Autoencoders in Tensorflow.

- **Neural Machine Translation**

- *Learning to Translate between English and French – [Report], [Code]*

- Developed an Machine Translation models that can translate english sentences into french using Recurrent neural networks. Achieved best results with attention mechanism. Dataset: Europarl English-French.
- Designed different models using; simple RNN, RNN with Embedding, Bidirectional RNN, Encoder - Decoder RNN. Achieved best results with attention mechanism. Data set: Europarl English-French.

- **Churn Prediction**

- *Predictive Modeling for Churn Rate – [Code]*

- Built different ML models: SVM, Tree based models, logistic regression for predicting customer churn rate using PySpark and Scikit-learn. Dataset: Telco Customer churn dataset.

- **Hyperparameter Optimization using Bayesian Learning**

- *Learning to find better hyperparameters for Machine Learning Models – [Report], [Code]*

- Developed an hyper-parameter optimization algorithm using bayesian methods that finds better hyper-parameters for machine learning models in smaller number of steps as compared to random search or grid search.

## OPEN SOURCE

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- **DeepClean**: Python package to clean and pre-process text and image data.
- **ML Notes**: Quick notes on Machine Learning. Read on the fly.
- **Data Science 101**: Notes and tutorials on how to use python, pandas, seaborn, matplotlib, scipy for data science.

## LEADERSHIP & ACHIEVEMENTS

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- **Scholarship**: Tuition scholarship for the academic year 2017, 2018 and 2019.
- **ResearchX**: Founder & Author of a blog on Research opportunitites in India. 1 Million+ monthly views by April 2017.
- **KC Xplore**: Founded and lead e-Newspaper of my undergraduate college [Video].
- **IEEE Club**: Vice-Chairperson of IEEE student chapter for the year 2013-14. Organized technical event, conferences.