Pradeep Singh

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Education

- **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
  - **Courses**: Machine Learning, Deep Learning, Numerical Optimization, Statistical Inference, Parallel Computing.
  - **Publication**: Models for Propagating Facilitation in Visual System. Accepted in ICIV, 2019
- **University of Mumbai** — Mumbai, India
  Bachelor of Engineering in Electronics and Telecommunication; GPA: 3.2 — *Aug. 2011 – July. 2015*

Technical Skills

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

- **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 meshs 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

- **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 adversial 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.

- **Visual Recognition using CNNs**
  Built a Image Recognition Web App using Flask – [Report], [Code]
  - 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.
  - Desgined 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.
- **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

- **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

- **Scholarship**: Tuition scholarship for the academic year 2017, 2018 and 2019.
- **ResearchX**: Founder & Author of a blog on Research opportunites 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.