SRIKRISHNAA J

Chennai, India ◇ ◇ ◇ ◇ ◇

AREAS OF INTEREST

Data Science, Business Intelligence, Machine Learning, Statistics, Data Visualization, Scientific Computing

PROJECTS

NIFTY-50 Stock Price Prediction

This is an end to end machine learning project to predict the future stock price (30-days) of Nifty-50 stocks from the data set available on kaggle (up to 30-Apr-2021). To predict the stock prices for 30 days from 30-Apr-2021, the stock price for the previous 1000 days was fed into a deep learning neural net consisting of LSTM layers, as sets of 100 days (set 1: day 1 to day 100 stock price to predict the stock price for day 101, set 2: day 2 to day 101 stock price to predict the stock price for day 102, etc). The same neural net architecture was used for all stocks which meant that for some stocks the model performed very well whereas for some stocks, the model performed poorly.

A website was deployed using Flask/MS Azure to display the results obtained from the models. The Google charts library was used to display the charts in an interactive way.

Flight Fare Prediction

This is an to end implementation of flight fare price prediction machine learning project. Using the EaseMyTrip website data set on kaggle, I trained a Random Forest Regressor to predict the flight fare prices (in Indian Rupees) between source and destination cities based on a rich array of feature variables such as date and time of arrival and departure, date of search, layovers and the corresponding flight carriers. A fair bit of data preparation was needed due to the variety in the data types of the feature variables. The model was deployed using python *Flask* module on the Heroku platform.

Classification of Iris species

This was my first end to end project. Using the Iris data set provided in the python *sklearn.datasets* package, I trained a machine learning model called Support Vector Classifier (*sklearn.svm.SVC*), to classify the different Iris species based solely on the sepal and petal features of the individual. The model was tested with known labelled data and performed extremely well. The model was finally deployed using python *Flask* module on the Heroku platform. The whole process was explained step-by-step and recorded on a Jupyter notebook file. I used this mini project to teach and train myself to create more end to end projects.

TECHNICAL STRENGTHS

Python

5+ years experience in scientific computation using Python libraries such as numpy, pandas, seaborn, matplotlib, scipy.

Strong knowledge of basic topics in machine learning and artificial intelligence.

Knowledge of implementation of machine learning concepts using Tensorflow 2.0 and scikit-learn packages.

Web Dev

Languages - HTML, CSS, PHP, MySQL

7+ years experience coding in HTML and CSS. Part of the web dev team for IISER Kolkata college fest 2 years in a row (2016 and 2017). I was in-charge of the website backend - implemented successfully using PHP and MySQL. Had the same role for college literary newsletter "Muse" website in 2018.

Successfully co-organized a week-long international online cryptography quiz event - "Cryptek" (2017). I was part of the quiz team as well as the sole member of the web dev team - designed both front end and back end of the website. Also made a separate quiz website for the pre-event promotional intra-college event "SHA256".

Other Programming Languages

Knowledge of Java, C++, C, and OOPS concepts and implementations.

MATLAB

Knowledge and experience implementing scientific computations in MATLAB.

Other Software

- **LaTeX**: 3+ years compiling and editing my report summaries on LaTeX, my preferred typesetting software.
- **MS Office**: working knowledge of MS Word, MS Excel and MS Powerpoint.
- **Operating Systems**: Have worked with Windows, MacOS, and Linux systems. Have the ability to switch between operating systems seamlessly. Comfortable with command line syntax of all three operating systems.

EXPERIENCE

Smart and Active Microbial Behaviour in Complex Environments Feb 2021 - Sep 2021
PhD (discontinued) *Dr. Anupam Sengupta, University of Luxembourg*

Microbial interaction with its microenvironment determines its activity and fitness and is crucial to ensure the survival of its species. The microenvironment, in itself, is a physical system which responds to collective microbial activity. This soup consisting of microbes and their microenvironment is a non-equilibrium system that provides the recipe for microbial adaptation, microenvironment manipulation, and eventually, the perseverance of life on the planet.

With a thoroughly mechanical approach to studying microbe-microenvironment interactions using tools from biological laboratory (cell culture, microscopy and image analysis) as well as agent-based and coarse grained in-silico models, the goal is to come up with a universal mathematical framework that could predict microbial behaviour, activity, fitness, based solely on the physical properties of the complex environment (density, topology, flow speed, topography, viscosity, etc.) and the morphology of the microbe (shape, aspect ratio, motile/non-motile, etc.).

Ultrafast Charge Carrier Dynamics of Silver Nanowires May 2019 - June 2020
MS Thesis *Dr. N Kamaraju, IISER Kolkata, India*

Ultrafast charge carrier dynamics studies in several materials have given important insights into the relaxation dynamics of carriers and possible bandstructure of the material. These studies have led to the effective utilization of these materials in the real world. Nanostructures are ubiquitous in material sciences due to a high degree of control in the structure during fabrication and their vast scope of applications. At the nanoscale, the charge carrier dynamics vary significantly from the bulk matter counterpart; hence it becomes important to study the ultrafast carrier dynamics of these structures as well. Several studies on metal and semiconductor nanostructures have shown that carrier dynamics are very sensitive to the nanostructure size and shape. This results in a high degree of tunability in

the nanostructures for diverse applications. An attempt to study ultrafast carrier dynamics of silver nanowires (AgNW) using pump probe spectroscopy is explained. Numerical simulations of nanoparticle and nanorod pump probe behaviour based on Mie theory and two temperature model were performed. The simulations (using MATLAB) show that the value of the negative absorption maxima tends to increase when the pump wavelength is decreased and the decay time of the pump probe absorbance signal tends to decrease with pump fluence. Finally, single beam transmitted light microscopy was performed on MoS_2 powder sample.

Quantum Weak Measurement August - November 2019
Independent Study Project *Dr. Nirmalya Ghosh, IISER Kolkata, India*

A quantum measurement which does not result in the collapse of the wavefunction into one of the eigenstates is known as weak measurement. In their paper, Aharanov, Albert, and Vaidman discuss weak measurement and illustrate it with a gedankenexperiment on the Stern-Gerlach apparatus. They calculate that depending on the orthogonality of the post selected state from the initial state of the system, the pointer value of the measurement can be far from any of the eigenvalues. Aharanov and several others have proposed and implemented weak measurement in optical systems. Over the course of a semester, I was able to study and provide insights from several different papers to observe weak measurements in optical systems to the BioNAP group in IISER Kolkata. I used python as a teaching/graphical tool in my presentations, to illustrate essence of weak measurement.

TNSA and Mathematical Modelling of Plasma May - July 2018
Summer Internship *Max Planck Institute for Nuclear Physics, Heidelberg, Germany*

The project involved solving a system of simultaneous partial differential equations in an attempt to monitor the fusion reaction taking place in stars. This experiment was simulated by Dr. Adriana Palffy and Dr. Yuanbin Wu using an existing fluid model for plasma. I succeeded in replicating their results in python.

EXPERIENCE AS A TEACHING ASSISTANT

Thermal Physics Jan - Apr 2020
Dr. Arindam Kundagrami, IISER Kolkata

Optics, Electronics, and Modern Physics Laboratory Aug - Nov 2019
Dr. Nirmalya Ghosh and Dr. Chiranjib Mitra, IISER Kolkata

EDUCATION

Indian Institute of Science Education and Research, Kolkata *2015-2020*
BS-MS dual degree in Physics (minor in Mathematics)
CGPA: 8.25/10

Chettinad Hari Shree Vidyalayam, Chennai *2015*
Indian School Certificate
Percentage: 96.4

Chettinad Hari Shree Vidyalayam, Chennai *2013*
Indian Certificate of Secondary Education
Percentage: 92.33

RELEVANT COURSES

Computational Physics (in Python), Probability and Statistics, Statistical Mechanics, Evolutionary Dynamics

FELLOWSHIPS

DTU ACTIVE	PhD - Luxembourg National Research Fund (FNR)
CSIR-JRF	Government of India fellowship for Junior Research Fellows
DST-INSPIRE	Government of India fellowship for top science undergraduates

COMPETITIVE EXAMS

GRE General	Jul 2019	Q:169/170 V:154/170
GRE Physics	Oct 2019	910/990
TOEFL	Oct 2019	110/120
CSIR NET Physics	Dec 2019	All India Rank 112 (99.54th percentile)

EXTRA-CURRICULARS

- Co-organiser of Cryptek '17 - an international online cryptography puzzle solving quiz event.
- Secretary of AARSHI (2017) - Dramatics Club of IISER Kolkata. Performed in the play "Wedding Album" by Girish Karnad (2016). Directed the play "Are You Watching Me?" by Tony Frier (2018).
- Kolkata topper of Mimamsa 2017, the annual science quiz competition held by IISER Pune.
- Hobbies: Gym, Jogging, TV shows, Movies and Books. Avid cricket fan and a fan of Borussia Dortmund football club.