

Siddharth Chaini

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RESEARCH INTERESTS

Astroinformatics, Data Science in Astronomy, Time-Domain Astronomy, Machine Learning in Physics

EDUCATION

Indian Institute of Science Education Research, Bhopal <i>Integrated Bachelor and Master of Science in Physics, CPI - 8.68/10</i>	Bhopal, India 2017 – 2022 (expected)
HSC Maharashtra Board - 12th <i>Overall: 86.0%, Computer Science - 99%</i>	Thane, India 2017
ICSE Board - 10th <i>Overall: 95.83%, Computer Applications - 100%</i>	Thane, India 2015

PROJECTS

Star - Galaxy - QSO Image Classification

Advisor: Prof. Ajit Kembhavi, IUCAA

August 2020 – Present

- Exploring the use of auto-encoders and deep convnets for the photometric classification of stars, galaxies and quasars across 5 channels
- Working with galaxies having small angular sizes (as based on their half light radius and point spread function)
- Working on integrating deep networks with traditional machine learning algorithms
- Developed a program for automated FITS retrieval, stacking, centering and cropping of SDSS objects across 5 passbands

Time-Series Classification of LSST Photometric Data

Course Project for DSE 301: Artificial Intelligence and its Scientific Applications

Feb. 2020 – June 2020

- Worked on a solution for the [PLAsTiCC Challenge](#)
- Implemented an ensemble of deep learning models to classify the time series data of the astronomical object
- Stacked ensemble of GRU and Dense networks was trained on 7878 samples, and achieved an accuracy of 76.2% on a test set consisting of over 2.5 million samples
- Report: <https://arxiv.org/abs/2006.12333>
Code Repository: <https://github.com/AKnightWing/Astronomical-Classification-PLASTICC>

Thermodynamic Properties of Ice - A Monte Carlo Study

Course Project for PHY 312: Numerical Methods and Programming

May 2020 – June 2020

- Implemented a Monte Carlo algorithm to study thermodynamic properties of ice
- Computed the residual entropy of a two-dimensional lattice model of ice at various temperatures, and identified the phase transition
- Created a visualisation tool for the two-dimensional lattice
- Report: [Click here](#)
Code Repository: <https://github.com/AKnightWing/ColdAsIce>

Authorship Identification

Course Project for HSS 322: Computational Linguistics

Nov. 2019

- Implemented an algorithm to identify the author of an unknown text
- Analyzed the characteristic n-gram frequencies of the author works in the training set and then matched to the data in the test set, similar to K-nearest neighbours
- Report: [Click here](#)
Code Repository: <https://github.com/AKnightWing/AuthID>

Coupled Harmonic Oscillators and Neutrino Oscillations

Course Project for PHY 206: Physics through Computational Thinking

April 2019

- Solved and simulated the Coupled Harmonic Oscillator on Mathematica
- Modelled neutrino oscillations by treating them as a coupled oscillator
- Mathematica nb file: [Click here](#)

Madhya Pradesh Police Project

Summer Project

June 2018 – Dec. 2018

- Worked with the police of Madhya Pradesh on a computer program to help catch local criminals based on their call records
- Handled large phone datasheets using pandas on Python

TEACHING EXPERIENCE

Teaching Assistant

Indian Institute of Science Education Research, Bhopal

Jan. 2019 – May 2019

Teaching Assistant, Lab Assistant and Grader for the freshman course ECS 102 – Introduction to Programming.

COURSES UNDERTAKEN

Astronomy & Physics:

Astronomy & Astrophysics*, Quantum Information & Computing*, Quantum Mechanics, Classical Mechanics, Statistical Mechanics, Computational Physics, Numerical Methods and five lab courses.

Maths:

Probability and Statistics, Calculus, Mathematical Methods.

Other:

Artificial Intelligence, Introduction to Programming, Computational Linguistics, Atmospheric Science and Evolution of the Earth.

Online Courses:

[Data Driven Astronomy](#), [TensorFlow Specialisation](#), [Applied Machine Learning](#), [Algorithms by Stanford](#)

Note: Courses marked with * will be completed by December 2020. A full list of courses can be found [here](#).

TECHNICAL SKILLS

Languages: Python, C, C++, Java, Wolfram Language, HTML, SQL, L^AT_EX, Assembly Language, Linux scripting

Software: Mathematica, SAOImage DS9

Developer Tools: Git, Docker, VS Code

Libraries: Astropy, NumPy, Keras, TensorFlow, pandas, scikit-learn, Selenium, matplotlib

ACHIEVEMENTS

Academic:

- DST Inspire Fellow
- Governor's Gold Medal awardee, Hiranadani Foundation School, Thane
- Topper in Computer Applications, ICSE Board, 2015

Sports:

- Runner-up in football at Sangharsh 2019, IISER Bhopal's Annual Sports Fest
- Runner-up in Hiranandani Estate Rotary Tournament for football in 2012 and 2013

Other:

- Winner of Codeplay 2019, IISER Bhopal's annual hackathon
- Winner of Model Solvay Conference 2018 at IISER Bhopal - Physics