Arnav Kumar

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Achievements

- 10^{th} in Canada, **Asian Pacific Mathematics Olympiad** 2022
- 11^{th} in Canada, **Canadian Association of Physicists High School Exam** 2022
- 2 time qualifier, 18^{th} in Canada, **Canadian Mathematical Olympiad** ..... 2021 - 2022
- Ranked 12^{th} in Canada and 17^{th} internationally, **Sir Isaac Newton Physics Exam** ..... 2021 - 2022
- Invited to write, **United States of America Mathematical Olympiad** 2022
- Bronze medalist for project on Prognosing IPF, **Canada Wide Science Fair** 2021

Experience

Data Science Intern @ Tektorch.ai Apr 2022 - Aug 2022

- Extracted features such as job title, location, classification, and pay from a jobs listing website using Python, Beautiful Soup 4, NumPy, and Pandas to create a dataset for analysis.
- Developed an end to end data visualization pipeline to ingest data and display trends using Matplotlib, NumPy, and RegEx.

CS Research Intern @ University of Alberta Jul 2021 - Aug 2021

- Trained and employed natural language processing models to help determine the cause of a change in depressive language in Tweets as part of a psychology study.
- Created an evaluation framework with graphs and videos to analyse subject mouse position data during exams.
- Developed automation pipeline in Bash to reduce time spent by 20x on the application of the evaluation framework.

Coding Instructor @ Code Ninjas West Springs Mar 2022 - Apr 2022

- Taught over 45 students to complete programming challenges in Scratch, MakeCode, and JavaScript.
- Managed the progress of the students and directly relayed feedback to the manager.

Projects

Prognosing Idiopathic Pulmonary Fibrosis (IPF) | *Python, Tensorflow2, Pandas, Scikit-learn*

- Implemented an auto-encoder, linear regression, dense neural network, and bayesian model in order to accurately predict future lung capacity and give a confidence value using initial lung capacity data, age, sex, smoking status, and more.
- Obtained a Laplace Log Likelihood score of -6.9, much better than the baseline score of -8.1, and a standard deviation of approximately 200mL.

CLI Chess Engine | *Haskell*

- Implemented maybe monads to create safe functions for when there is nonsensical function application.
- Employed the use of applicative functors and monad operations on lists to write more concise code for tasks such as finding the cartesian product of two lists.
- Created custom Haskell data types (such as a position data type) and ensured that no data could be created which has no meaning in the context of the program.

Braille ASCII Art Generator | *Python, OpenCV*

- Used thresholding in OpenCV to determine which pixels of the output art should be shaded.
- Tranformed the image array into braille characters using 3x2 pixel filters which returned a binary number corresponding to a braille character.

Modular Personal Website | *JavaScript, HTML, CSS*

- Built a simple content management system (CMS) with JavaScript to generate a DOM object from given data.
- Added JSON based templating to easily modfy website based on the type of information being conveyed.

Blackjack | *C++*

- Used object oriented programming to implement a local multiplayer blackjack game with a computer playing as the house.
- Probabalistically optimized the holding value which the computer house uses.

Education

Candidate for BSc. Computer Science @ University of Waterloo 2022 - Present

- Received the Ronald G. Dunkley National Scholarship.
- Received the President's Entrance Scholarship of Distinction.

Skills

Languages: Python, C++, JavaScript, Haskell, Java, Bash, LaTeX, HTML, CSS, Markdown, Regex
Libraries: Pandas, Matplotlib, NumPy, Beautiful Soup, Tensorflow, Scikit-learn, OpenCV