Aaron Rock Menezes

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Education

BITS Pilani, K.K. Birla Goa Campus Expected Aug 26
Masters of Science in Biological Sciences *Goa, India*

BITS Pilani, K.K. Birla Goa Campus Expected Aug 26
Bachelor of Engineering in Electronics & Instrumentation (Minor in Data Science in Climate & Health) *Goa, India*

Relevant Coursework:
Probability & Statistics, Applied Statistical Methods, Machine Learning, Linear Algebra, Intro to Bioinformatics, Foundations of Data Science, Object Oriented Programming

Achievements:
INSPIRE Scholar - Among top 1 percentile of science students in class 12 HSC board examinations and performed consistently well in school.
Google Summer of Code (**GSoC**) Mentor - Mentor at DeepChem for the project, Target Conditioned Antibody Sequence Generation Using Protein Language Models.

Experience

Deep Forest Sciences Dec 2023 – Present
ML Engineering Intern *Remote*

- Implemented an image preprocessing pipeline for Prithvi, a no-code platform to aid in Drug Discovery.
- Developed both the frontend and backend for two key primitives, automatic Object Counting and Image Segmentation, significantly improving the image data support for the platform.

DeepChem Dec 2023 – Present
Open Source Contributor *Remote*

- Implemented the Synthetic Complexity Score model and UNet model into the open-source DeepChem package using a PyTorch backend.
- Created a tutorial on Automating Cell Counting and Segmentation using a CNN and the UNet model resulting in an increase in site traffic by 10%.

APPCAIR, BITS Pilani Jan 2023 – Present
Undergraduate ML Researcher *Goa, India*

- Currently working on a semi-automatic Molecule Generation and Retrosynthesis assistance system for generating and synthesizing novel molecules for inhibiting a protein by providing logical feedback to LLMs.
- Designed and implemented a CNN-LSTM model for prediction of Location-Specific RNA-Protein Interactions and their interaction matrices using PyTorch.
- Improved performance on the XGBoost based XRPI model for RNA-Protein interaction prediction by 5% by improving data pre-processing while optimizing the model to be 10% faster.

CSIR-Central Electronics Engineering Research Institute May 2023 – Jul 2023
AI Research Intern *Rajasthan, India*

- Conducted exploratory data analysis to find correlation, seasonality and trends in single/multi-channel EEG data with respect to individual finger movement.
- Created an Attention based model to classify finger movements when given multi-channel EEG data, achieved an accuracy of about 85% and a F-Score of 0.75
- Presented my results to board of senior researchers and visiting scientists and incorporated changes into the system while receiving high praise for the novelty of my methods.

Projects

Mixture of Experts layer from scratch | *Python, PyTorch, HuggingFace*

- Created a Mixture of Experts(MoE) layer from scratch using a MLP as an expert in PyTorch.
- Benchmarked a BiLSTM model with and without a MoE layer on the CoNLL 2003 dataset for Named Entity Recognition. Observed a 12% increase in accruacy and a 32% increase in F1 Score.

Prediction of Finger Flexion using ECoG data | *Python, Tensorflow, Scikit learn, Pandas*

- Used multi-channel ECoG data from a NEURIPS competition and the Stanford online library to create an Attention-LSTM based model which **surpassed State of the Art results by 30%**
- Conducted exploratory data analysis to find gaps in data and pre-processed data accordingly while creating a dashboard to visualize the changes.

Time Masked Autoencoders for Fluid Dynamics | *Python, TensorFlow, PyTorch*

- Designed and implemented a system which simulated a variation of the **Shallow Water Equation** using numpy and matplotlib while randomly masking the a set number of frames.
- Worked with a post-doc researcher from the **Imperial College, London** to study the effects of random masking in time series autoencoders and designed autoencoders to **mimic PCA on images with a loss of 1e-3.**
- Implemented multiple models to **predict up to 10 frames** of the simulated Shallow Water equation with upto 80% random masking of frames whilst **maintaining a SSIM of at least 80%.**

Rock detection and classification system | *Python, TensorFlow, Linux*

- Developed an in-house assembly for a student built Mars rover to detect signs of life autonomously using **chemical assays and Computer Vision.**
- Designed and deployed an autonomous transfer learning based multi-class rock detection and classification system to detect and identify rocks based on their biological significance, this system also won the **Excellence Award at the International Rover Challenge (IRC), India.**
- **Led a team of 7 members** and collaborated with other verticals to ensure efficient execution of tasks. The team achieved **2nd place at the Anatolian Rover Challenge (ARC), Turkey**

Technical Skills

Languages: Python, JavaScript, CSS, VBA
Frameworks: TensorFlow, PyTorch, Flask, Scikit-learn, Git, Linux
Concepts: Operating System, Object Oriented Programming, Machine Learning, Deep Learning
Research Interests: ML for Applied Sciences, Computer Vision, Computational Biology