TAWSIF AHMED

AI RESEARCHER
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An Artificial Intelligence researcher. I have 4 years of experience in Artificial intelligence, mainly in the field of Natural Language Processing and Computer Vision. In the past, I have developed advanced neural network architecture for prestigious academic institutions, promising startups and personal projects. Proven success in neural net architecture, datasets preparations, mathematical functions (activations, optimizer and loss) and scalability of models. A strong understanding in NLP, CV and quite recently, Quantum Computing.

PROFESSIONAL EXPERIENCE

LEAD AI RESEARCHER
HARVARD GAMI, HAVRARD UNIVERSITY, Cambridge, MA
September 2022–Present (Full-time)

- Currently, developing state of the art artificial intelligence solutions to detect cancer in its early stages via medical scans.
- Combined grid search and second derivative optimizers to achieve high accuracy
- Developed two fully automated and semi-automated masking solutions, through FAIR's SAM and QuPath models to annotated the datasets
- Benchmarked models between first derivative and second derivative optimizer trained models
- Collaborating with *Dr. Anna Yaraslovsky (University of Massachusetts Lowell)* and *Dr. Victor Neel (Massachusetts General Hospital)* to deploy it for clinical trials in Massachusetts General Hospital by the fall.

TECHNICAL CONSULTANT
CAPVISION, New York City, New York
May 2023–Present (Part-time)

- Signed with CapVision to provide feedback to their multi-million-dollar clients at 400$ per hour rate.

LEAD AI RESEARCHER
THE PLASTIC PROJECT, Kirkland, Washington
April 2023–Present (Part-time)

- Helped high schoolers to develop a DIY powerful image classifier using Lobe.ai
- (Reverse Engineered + re-wrote WasteNet) (UK Government's waste management DL model) to classify garbage adhering to Kirkland laws.
- Working alongside the local government for the deployment of our solutions in the community and through governmental recycling applications.
- Packaged the website in PWA.
- Currently deployed and accessible online **(BETA PHASE)**

UI/UX DESIGNER & DEVOPS
OCTOML, Seattle, Washington

October 2022-November 2022 (Contractor)

- Provided feedback & advise to improve the platform for fast deployment by AI researchers and people will little knowledge in DevOps
- Pointed out flaws and unrequired complexities of both the UI and the DevOps portion of the platform.

BEAMLINE FOR SCHOOLS COACH
PAKISTAN ATOMIC ENERGY COMMISSION, PAKISTAN
January 2023-Present

- Taught high school students high energy physics and Machine Learning
- Helped them to develop both idea and proposal for Beamline for Schools
- Helped the students to create a Quantum Algorithm to recognise faint sounds produced by particles while they collide and recognise particles based upon that

SOFTWARE/ALGORITHM TESTER
TARTEEL AI, San Francisco, California
August 2020-September 2020 (Part-time)

- Tasked to test app UI and voice recognition Algorithm

VOLUNTEER LECTURER
ARTE, The Open Lab, Yale University, New Haven, Connecticut
October 2021-October 2021 (2 weeks)

- Taught New Haven School Students Electrical Physics (performing Circuits and switch making & experiments)

RESEARCH COLLABORATION
IFJ PAN INSTITUTE OF NUCLEAR PHYSICS POLISH ACADEMY OF SCIENCES
December 2021-March 2022

- Collaborated with Krzysztof Woźniak to create DIY Neutrino Detector for Beamline for Schools competition

EDUCATION

DHAKA CITY COLLEGE, Dhanmondi, Dhaka
September 2020 – February 2023

High School Degree in (Literature + Pure Science + Maths + Computer Science),
Grade: A *(Taking a Gap Year)*
Key Points:

- Studied introductory Quantum Mechanics and advanced Mathematics
- ICT aka Computer courses included courses in Circuits, programming in C++ & web development
- Selected to be club president in two different clubs i.e. Debate & English
- Active member in all the clubs most notably being English & Art
- Worked as volunteer & planner in English club's national festival

WOLFRAM SUMMER SCHOOL, Boston, Massachusetts
June 2023-July 2023 (3 weeks)
Key Points:

- Received 100% Financial Aid (3000$) to participate in the program
- Wolfram Mathematica & Research's Owner **Stephen Wolfram** advised me to work on, "**Analysing rare words in Wikipedia**".
- Modified Stephen Wolfram's recommendation, and developed my thesis on "Analysing rare and **NER (Named Entity Recognition)** words in Wikipedia through **Large Language Models**"
- Against traditional methods, Large Language models were extremely successful

- Able to provide a proof of concept, Large Language Models has the potential to replace NER domain specific neural network models which costs from hundreds to thousands to train.
- Discovered a potential extension, where through the analysis of words on different layers of Large Language Models, and forming a complete sentence for high resource language such as English, we can understand how complicated Constructed Language are learnt by the Language models as well and thus breaking the linguistics puzzle of language development in Large Language Models and helping us in both Linguistics research and adding context and meaning and cognitive aspects in conversations between humans and AI
- Further comparing the development of a sentence in Large Language model example of flow of information in state-of-the-art Artificial Intelligence(AI) models and then comparing it against flow of information in human brain
- Proceeding paper for my project will be published in the next few weeks
- Finally, performed a small extension of my thesis by making table of inflection for exotic languages such as Latin, Greek and Hebrew via OpenAI's GPT 3.5 Turbo model

TAKE ACTION LAB, GLOBAL CITIZEN YEAR PROGRAM, Cape Town, South Africa
August 2023-December 2023 (3 months in South Africa)

- Deprecated: Due to health concerns regarding visiting South Africa

SUMMER CAMPS

TECH & JOURNALISM CAMP, THE STANFORD DAILY, STANFORD UNIVERSITY, CA
September 2021-September 2021 (3 weeks)

- Accepted as one of 10 participants
- Studied fundamental knowledge of JavaScript and web development
- Studied responsible journalism and ethics
- Received 100% Scholarship

SYNTHETIC BIOLOGY CAMP, STANFORD UNIVERSITY, CA
September 2022-October 2022 (3/4 weeks)

- Studied Genetic engineering and DNA
- Performed DNA modification and Analysis using Software
- Studied Bioinformatics Algorithms and wrote them.

SUMMER SCHOOL

COMPUTATIONAL NEUROSCIENCE SCHOOL, NEUROMATCH ACADEMY, REMOTE
July 13 2023-July 28 2023 (3 weeks)

- Received 100% Financial Aid to participate in the program
- Studied Introduction-Intermediate level Computational Neuroscience
- Developed Computational Neuroscience Project: **Finding the flow of information in brain through Functional Connectivity** (used Steinmetz dataset)
- Programmed 50% of the entire final project by myself
- Praised by TAs' for proposing exotic mathematical methods to calculate complex formulas with ease

COLLEGE CREDITS

4TH ANNUAL CONFERENCE ON DISABILITY IN HEALTHCARE AND MEDICINE, STANFORD MEDICINE, STANFORD UNIVERSITY, CA

- Received 6.00 AMA PRA Category 1 Credit(s)TM for the live activity

ACTIVISM ACTIVITIES

MENTORSHIP FOR PROJECTS ADDRESSING TO SOLVE SOCIAL INJUSTICE IN ASIA/OCENIA, PEACE FIRST, Boston, MA
May 2023-June 2023

- Received 1:1 mentorship for my project
- Selected as one of the top 10 projects from their application pool in South East Asia/Oceania
- Opportunity to meet impactful changemakers and learn the process of activism and changemaking from them.

CONFERENCE & ACTIVITIES

NATIONAL IQ TEST
December 2020-December 2020 (1 week)

- Secured 3rd position among 250 high school seniors from top schools in Bangladesh

INTERNATIONAL CONFERENCE FOR LEARNING REPRESENTATION (ICLR), Virtual
May 2021-May 2021 (1 week) – 2 times (2021 & 2022)

- Web testing, monitoring the website & looking for bugs and errors.
- Helping Authors and moderators with video infrastructure software & monitoring chat rooms for code of conduct violation
- Conducting Q&A sessions after Orals with moderators, and helping them to select important questions and forward them.
- Answering questions on technical issues in the helpdesk

INTERNATIONAL CONFERENCE FOR MACHINE LEARNING (ICML), Virtual
July 2021-July 2021 (1 week)

- Conducting 3 Orals as the youngest moderator in ICML history (high school junior)
- Web testing, monitoring the website & looking for bugs and errors.
- Helping Authors and moderators with video infrastructure software & monitoring chat rooms for code of conduct violation
- Conducting Q&A sessions after Orals with moderators, and helping them to select important questions and forward them

CONFERENCE ON NEURAL INFORMATION PROCESSING SYSTEMS (NEURIPS), Virtual
December 2021-December 2021 (1 week)

- Web testing, monitoring the website & looking for bugs and errors.
- Helping Authors and moderators with video infrastructure software & monitoring chat rooms for code of conduct violation
- Conducting Q&A sessions after Orals with moderators, and helping them to select important questions and forward them.

OX-WSDC , THE OXFORD UNION, Oxford, England
April 2021-June 2021

- Selected as one of the 10 independent teams among 100 total selected team for highly prestigious debate competition for high school students
- Competed against sixth forms like Eton College.
- Praised by the judges for gifted logical and reasoning skills.
- Received partial 80% scholarship

HARVARD SCIENCE AND RESEARCH CONFERENCE (HSRC), MA, Cambridge
October 2021-October 2021 (3 days)

- Selected among one of the 250 participants from 1000+ applications as one of the advanced high school students
- Received the chance to learn key academic qualities from Harvard Professors
- Received 100% scholarship

INTERNATIONAL ASTRONOMY AND ASTROPHYSICS COMPETITION (IAAC), Virtual
April 2021 (1 month)
- Received a Bronze award in the competition

FEMTECH BERKELEY 2022
April 2022-April 2022 (1 day)
- Had the opportunity to learn scalability and best software practices from industry experts
- Developed a project using lobe.ai to detect nail styles and tell its name

HARVARD COLLEGE VISION PROGRAM, Cambridge, MA
March 2022-March 2022 (1 week)
- One of the 30 students selected from an application pool of 1000s
- Learned Medical Leadership and activities
- Participated in Case Study
- Received 100% scholarship

HARVARD UNICEF CONFERENCE, Cambridge, MA
February 2022-February 2022 (3 days)
- Accepted for the Conference and participated as one of the 30 few individuals
- Participated in Environment and Climate Change Project
- Accepted in both 2022 & 2023 Conferences with 100% scholarship
- In 2023, served as an Ambassador for the Conference

IMMERSIVE ESSAY COMPETITION, UK
January 2022-February 2022
- Accepted into their program with 20% scholarship

HARVARD UNDERGRADUATE INTERNATIONAL RELATIONS SCHOLARS PROGRAM, Cambridge, MA
May 2023-June 2023 (2 months approx.)
- Accepted to Harvard's Prestigious International Relations program as a gap year student
- Considered as one of the best applicants they received in 2023 application pool
- Full scholarship was awarded

TEACHING AND MENTORSHIP/ACADEMIC ADVISOR

HARVARD GAMI, HARVARD UNIVERSITY, Massachusetts, Cambridge
(Performing this role every year)
- Performing the role of (academic advisor + mentor) for first year undergraduate students at Harvard University
- Teaching them about Artificial Intelligence & Neuroscience
- Being their academic and research advisor for entire four years of their undergraduate program for the selected students by Harvard GAMI

INTERNSHIPS

DONDERS INSTITUTE FOR BRAIN, COGNITION, AND BEHAVIOUR, **GENZEL LAB**, Netherlands
Research Assistant Intern
August 2023 – Undefined
- Offering help in multiple Computational Neuroscience projects, mainly focusing on HexMaze Project: delta oscillations during sleep.
- Internship with the possibility to shift towards a full-time researcher position as a Computational Neuroscientist.

- Internship terms are extremely flexible. I can continue the internship as long as I want either part-time/full-time, with preferred working hours.
- Received this position first hand, even before finishing my prestigious Summer School at Neuromatch.

PROGRAMMING LANGUAGES

1. Python
    - Primary programming language
    - Advanced level expertise
    - 4+ years of experience developing advanced software, data analysis and artificial intelligence

2. C
    - Secondary programming language
    - Intermediate level expertise
    - 2 years of experience writing algorithms

3. Wolfram Language
    - Favourite functional programming language
    - Intermediate level expertise
    - 10 months of experience writing algorithms, data analysis and artificial intelligence

4. Julia
    - Hobbyist programming language
    - Intermediate experience and can use Julia notebooks
    - 1.5 years of experience performing data analysis

5. LaTeX
    - 2 years of experience in LaTeX by using Texmaker

6. Scilab
    - Preferred Matrix Programming Language
    - Intermediate level expertise
    - 11 months of experience writing algorithms and computational mathematics

Fields of Expertise:

1. Artificial Narrow Intelligence (ANI) (e.g. RHLF, CNN, NLP and vice versa) **(Advanced level)**
2. Cognitive Artificial Intelligence/Neuromorphic Artificial Intelligence **(Intermediate level)**
3. Statistical Machine Learning **(Advanced level)**
4. Computational Neuroscience **(Intermediate level)**
5. Computational Mathematics **(Intermediate level)**
6. Particle Physics **(Advanced level + mainly in Neutrino/high-energy beams/particle interaction)**
7. Synthetic Biology **(Beginner level)**
8. Quantum Computing **(Intermediate level)**
9. Quantum Artificial Intelligence **(Intermediate level)**

FRAMEWORKS

1. DEEP LEARNING FRAMEWORKS

- Tensorflow (Advanced level)
- Pytorch (Intermediate level)
- Jax (Intermediate level)

- PyBrain (Intermediate level)

2. **MATHEMATICS & DATA ANALYSIS**

- Numpy (Advanced level)
- Pandas (Advanced level)
- SciPy (Advanced level)
- Scikit-learn (Advanced level)
- Matplotlib (Advanced level)

3. **SOFTWARE ENGINEERING/WEB-DEVELOPMENT & DATABASE**

- Django (Intermediate level)
- Flask (Advanced level)

4. **QUANTUM COMPUTING & QUANTUM ARTIFICIAL INTELLIGENCE**

- Qiskit (Advanced level)
- PennyLane (Advanced level)
- lambeq (Advanced level)
- DisCoPy (Advanced level)

5. **COMPUTATIONAL NEUROSCIENCE**

- Nengo (Intermediate level)
- NetworkX (Advanced level)
- Statsmodel (Advanced level)
- Brainrender (Beginner level)
- Navis (Intermediate level)

GITHUB PROJECTS

WasteNet
- Reverse engineered UK's government's leading waste classification deep learning model.
- It uses a new technique, introduced in the paper i.e. Hybrid Tuning
- Wrote this from scratch using Tensorflow

Wolfram Challenge
- I upload solutions for trending and competitive programming challenges available on Wolfram Challenges in this repo.

Siamese Neural Networks
- From scratch wrote siamese neural networks using triplet functions and cosine distance.
- Trained on Cifar-10 dataset

VQC Algorithm
- Taught myself writing Variational Quantum Circuit through PennyLane
- It helps to tap into the advanced and custom algorithm space in the Quantum field. Most notably, Quantum LSTM Network.

Barren Plateaus

- A phenomenon in variational circuits where the cost function landscape is flat.
- This means that a variational circuit initialised in one of these areas will be untrainable using any gradient-based algorithm.
- Written this in PennyLane

Shallow Quantum Neural Model

- A model inspired on the principles of shallow learning, much like LeNet5
- Written in Pytorch and PennyLane

Superoptimizer

- Read through this wonderful programming concept known as superoptimizer and tried writing it.
- Went through University notes to write this concept.

Commath Scilab

- Introduction to Scilab programming language through Computational Mathematics
- Advanced Algorithms and Mathematical theorems implemented using Scilab
- On-going to recreate PhD and thesis projects from French universities using Scilab

Neuromorphic-Chip

- Going over the Nengo library to perform artificial intelligence and mathematical tasks on Loihi Chipset
- Practice notebooks about Cognitive Artificial Intelligence and Brain-Machine inspired models
- Understanding the components such as memory and control concepts being recreated in Neuromorphic method present in actual human brain

Tuning Curve

- Plotting tuning curves of neuron firing rates over certain set of trials using 1D graphs

Navis

- On-going effort of mine, to plot a 3D actual graphical structure of neurons via csv dataset.
- A Joint learning effort to teach myself, visualise a certain neuron in brain from dataset with graphics and as well as visualising entire brain and parts of brain relevant from a dataset using Allen SDK.

Plasticity STP

- A personal project
- Finding short term synaptic plasticity(STP) by analysing neuron firing rate through Steinmetz dataset
- Used Normalisation slope method to find STP

Computational Neuroscience

- A collection of datasets and statistical and Bayesian methods used in computational neuroscience
- Methods included in this repository are state of the art and exotic

Clipsearch

- Fine-tuned CLIP model from OpenAI and performed a search operation on them
- Similar to Google Image Search but with Contrastive learning and CLIP

Text2Clip

- Generating images via text prompts through CLIP model in 17 lines

Note:

1. Kindly, visit my GitHub profile to find a comprehensive collection of all the projects I have authored
2. I continuously update my GitHub profile with new projects and commits, three times a week
3. Right now, I am shifting towards (tutorial + advanced) projects
4. Most of my important repositories are private

CURRENTLY WORKING

1. Developing a startup with friends for Microsoft Imagine Cup 2024
2. Studying Bioinformatics and Chemical NLP
3. Pathological Curvature analysis for maths function in BMI (Brain-Machine Inspired Models)
4. Learning Causal inference from group-up to advanced
5. Mastering Web-development + designing

(FEATURE) WEB-DEVELOPMENT + DESIGNING

1. 3D Photo Gallery (Prague Design Quality) https://github.com/sleeping4cat/yuxin-gallery
2. Story Book Theme (Ukrainian Quality) https://github.com/sleeping4cat/little-dream
3. Moonlit Night (Immersive Europe) https://github.com/sleeping4cat/little-maggie
4. Timeless Mind Creativity (French Design Quality) https://github.com/sleeping4cat/sleepingcat
5. Canvas Approach (Chinese Quality) https://github.com/sleeping4cat/little-maggie-chinese

NOTE: Web Development projects are stored in my second account **(@sleeping4cat)** and some projects were made to surprise someone special considering that place-holder texts might include not limited: love and affection. Please disregard that and navigate to the active development branch and deployments.

LANGUAGE SKILLS

1. English (Native Speaker + First Language) + (Both speak, read + write)
2. Bengali (Native Speaker) + (Both speak, read + write)
3. Hindi (Native Speaker) + (Only speak)
4. Urdu (Native Speaker) (Only Speak)
5. German (Intermediate Speaker) (Both speak, read + write)
6. Spanish (beginner Speaker) + (Both speak, read + write)

SOFT SKILLS

- Friendly and calm attitude with strong leadership skills. And led about 30 teams in deep learning which consisted of master's and PhD students from Ivy league universities and top universities around the world.
- Expert networking and connecting skills
- Experienced in marketing and promotion. And worked as a salesman for 6 months while in middle school.

ETHICS & INTEGRITY

PROGRAMMING CLAUSE

I hereby declare all code and materials showcased on my resume are work completely, partially, Or fractionally owned, Or co-owned by me. I have the proper rights to distribute, modify, utilise and share the code while maintaining proper code of conduct agreements and licence clauses described by the respective owners and contributors.

Common programming etiquettes and practices such as reading documentation, notes, text-books and tutorials and utilising their respective knowledge and use them as learning resources do not make the authors of those materials entitled to any/all shoutouts, mention, or any form of promotion and credit until they have explicitly required in their copyright note to exercise it for the readers by default.

ARTIFICIAL INTELLIGENCE GENERATED CONTENT

I acknowledge Artificial Intelligence to be an important tool in the learning process and synthetic data production for mundane work. Artificial Intelligence tools of any form (text, video, audio, code) not limited but beyond if and were exercised in any of my work were properly cited.

But exemptions were made if an intelligent agent was used for nominal, mundane and repetitive tasks.

CREATIVITY AND DESIGNING

I have complete ownership of the creative ideas and thoughts, which are responsible for making my projects already that are completed/on-going and beyond. If there were other individuals and entities involved in the ideation phase, they are properly mentioned in the respective work.

In terms of designing, I took inspiration from landscapes, picturesque scenes and artistic examples and other moments, took publicly available, licenced under creative commons Or equivalent licence and permissible media and multimedia (video, textual designs, typography, fonts, canvas, scenes, photographs, creative assets, 3d models) not limited to but beyond and made use in my programming, software and artistic activities.

Proper credits are given to all artists, creative individuals and entities whose creations, assets and materials were/are used in my works. Though, in some extreme circumstances where proper credits individuals' information were not readily available it was left blank. But I completely allow the concerned entity whose work might be used in my project and not properly credited to email for allowing me to update the relevant works of mine where it may be in use.