ARJUN AGARWAL

B.E. Computer Science & M.Sc. Economics

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WORK EXPERIENCE

Qure.AI

Senior AI Scientist
Apr 2024 - Present

AI Scientist
Jul'22 - Mar'24 · 1 year 9 months

AI Scientist Intern
Jul 2021 - Jun 2022 · 1 year

- Experimenting with large-scale **self-supervised pretraining** methods such as *SimMIM (masked image modeling)* and *MedCLIP* (*contrastive learning* tailored towards medical images) to create a **foundation model for three-dimensional spatial radiological imaging**.
- Exploring multiple architectures like *SwinV2*, *MaxViT*, *ViTDet*, *ConvNext*, *EfficientNet*, *SeResNet*, etc., coupled with a *BERT*-based text encoder, to create the best image encoder possible.
- Developed multiple models with over 300 experiments performed to detect stroke in Head CT and MRI scans:
  - Developed a **semantic segmentation** model using a *U-Net* architecture for identifying strokes on Head MRI scans, achieving a **Dice coefficient of 0.7**.
  - Developed a proprietary **classification + detection** algorithm by stacking and combining four *ResNet*-based models and image registration to identify occlusions in the large vessels of the brain on Head CTA scans, achieving an **average AUC of 0.98**.
  - Developed multiple **multi-class classification + segmentation** models using CNN-based, transformer-based, and hybrid encoders to solve for various problems on Head NCCT scans, achieving **AUCs of 0.90-0.96 and Dice coefficients of 0.25-0.7**.
- Utilized image registration, tilt correction, symmetry attention, synthetic data generation, and other novel approaches to solve for challenges relating to data quality and quantity, noisy labels, and limited infrastructure.
- Streamlined model deployment by optimizing preprocessing steps, implementing tracing, and modularizing the code, resulting in a **57% reduction in turnaround time** of production models and **making it future-proof**.
- **In-charge of production code** relating to AI processing and output generation for our emergency response product (qER).
- **Co-authored multiple papers and abstracts** in various computer vision and medical journals and conferences (some listed below). **Co-invented patents too**.

ReeBorn TotalHealth

Co-founder
Aug 2021 - Jun 2022 · 11 months

- Reversed chronic illnesses such as diabetes, hypertension and obesity using artificial intelligence
- Leveraged data collected from wearables and other devices, the current lifestyle of the customer, and preferred food choices, to generate an optimal diet and exercise regimen capable of reversing chronic illnesses and remove their dependency on drugs.

Aditya Jyot Eye Hospital

Research Intern
May 2019 - Jul 2019 · 3 months

- Conducted research on the impact of diabetic retinopathy on the QoL of the patient and carer
- Designed a research pipeline involving a self-built questionnaire vetted by ophthalmologists
- Analyzed 115 data points collected from all over Mumbai using a *multi-regression model*
- Findings submitted to the Ministry of Health and Family Welfare, India

TATA Power

Digitization Intern
Jun 2018 - Jul 2018 · 2 months

- Identified and classified faults in solar farms using thermal images taken by overflying UAVs
- Designed a solution to monitor the health of certain plant equipment using sensor feedback
- Used *Arduino UNO*, *ESP8266* and sensors to implement a prototype of the monitoring solution

EDUCATION

Stanford Center for Professional Development, Stanford University

Reinforcement Learning — Jan 2023 - Apr 2023

- Grade : A

Birla Institute of Technology & Science, Pilani (BITS Pilani) - Goa Campus

Master of Science, Economics — 2017 - 2022

Bachelor of Engineering, Computer Science — 2017 - 2022

- Computer Science Major GPA : 9.31 / 10
- Overall GPA : 8.67 / 10

PATENTS & PUBLICATIONS

Patents

- Kumar, S., **Agarwal, A.**, Golla, S., Tanamala, S., Putha, P., Chilamkurthy, S., Warier, P. (2024). A System and Method for detecting large vessel occlusion (LVO) on a computational Tomography angiogram (CTA) automatically. *U.S. Patent 11967079*. Granted on 23rd Apr 2024
  (The same has also been applied for in India. Patent pending. Application number: 202321007170)

Publications

- Kumar, S., **Agarwal, A.**, Golla, S., Tanamala, S., Upadhyay, U., Chattoraj, S., Putha, P., Chilamkurthy, S. (2023). Mind the Clot: Automated LVO Detection on CTA using Deep Learning. *IEEE/CVF International Conference on Computer Vision Workshops (ICCVW), Paris, France, 2023*, pp. 2495-2504. doi: 10.1109/ICCVW60793.2023.00264
- Govindrajan, A., **Agarwal, A.**, Chattoraj, S., Robert, D., Golla, S., Upadhyay, U., Tanamala, S., Govindrajan, A. (2023). Identification of Hemorrhage and Infarct Lesions on Brain CT Images using Deep Learning. *arXiv* 2307.04425. doi: arXiv.2307.04425
- Louis, J., **Agarwal, A.**, Mondal, S., and Talukdar, I. (2021). A global analysis on the differential regulation of RNA binding proteins (RBPs) by TNF−α as potential modulators of metabolic syndromes. *BBA Advances*, 100037. doi: 10.1016/j.bbadva.2021.100037
- Louis, J., **Agarwal, A.**, Aduri, R., and Talukdar, I. (2021). Global analysis of RNA–protein interactions in TNF-α induced alternative splicing in metabolic disorders. *FEBS Letters 595*(4), pp.476–490. doi: 10.1002/1873-3468.14029
- Mishra, B., Raghuraman, R., **Agarwal, A.**, and Aduri, R. (2019). Finding small molecules with pan-serotype activity to target Dengue non-structural protein 1. *VirusDisease 30*, pp.477–489. doi: 10.1007/s13337-019-00561-2

Conferences

- **Agarwal, A.**, Bharti, N., Ghosh, T., Golla, S., Bains, N., Chamadia, R., Putha, P., Qureshi, A. (2024). Streamlining assessment of Mechanical Thrombectomy eligibility in Acute Stroke: An AI Approach using NCCT and CTA. *International Journal of Stroke, World Stroke Congress*. doi: Accepted. Publication in Oct 2024
- **Agarwal, A.**, Upadhyay, U., Golla, S., Putha, P., Tarpley, J. (2023). Using AI to quantify Gaze Deviation on NCCT scans to predict Large Vessel Occlusion in stroke patients. *International Journal of Stroke, World Stroke Congress*, EP717 / #2597. doi: 10.1177/17474930231192010
- **Agarwal, A.**, Upadhyay, U., Golla, S., Kumar, S. (2023). Application of AI for Infarct Detection on non-contrast CT scans and its efficacy in predicting Large Vessel Occlusions in Stroke cases. *International Journal of Stroke, World Stroke Congress*, O090 / #2079. doi: 10.1177/17474930231192010
- Upadhyay, U., **Agarwal, A.**, Golla, S., Tanamala, S., Putha, P., Chilamkurthy, S. (2023). Volumetric Estimation of Infarct on NCCT – An AI Based Technique. *British Institute of Radiology AI Annual Conference*
- Kumar, S., **Agarwal, A.**, Tanamala, S., Golla, S., Putha, P., Upadhyay, U., Chilamkurthy, S., Pandian, J. (2022). Deep Learning based LVO detection on CT Angiography of Brain. *International Journal of Stroke, World Stroke Congress*. doi: 10.1177/17474930221125973
- Kumar, S., **Agarwal, A.**, Tanamala, S., Golla, S., Putha, P., Upadhyay, U., Chilamkurthy, S., Pandian, J. (2022). Deep Learning Guided Extraction of the Brain's Vascular Territories on CT Angiography. *American Society of Functional Neuroradiology*
- **Agarwal, A.**, Singhal, S., Golla, S., Tanamala, S., Chilamkurthy, S., Pandian, J. (2022). AI-guided Infarct Detection on MRI DWI. *Indian National Stroke Conference*

HONORS & AWARDS

Course Mentor
Excellent Performance
Artificial Intelligence

Teaching Assistant
Excellent Performance
Computer Programming

Teaching Assistant
Excellent Performance
Microprocessors & Interfacing

Maharashtra State Board (HSC)
Top 1% in State
Class 12th Exam

7th National Cyber Olympiad
Gold Medalist
All India Rank 2291

University of New South Wales (Macmillan)
Top 5% in India
Mathematics IAIS

TECHNICAL SKILLS

Programming Languages
Python | C++ | Java | C | VBA

Data Science
PyTorch | Lightning | NumPy | Pandas | Matplotlib | Tensorflow

Web Development
React | Redux | Django | HTML | CSS | BeautifulSoup

Cloud and Distributed Computing
AWS | GCP | Docker | Kubernetes

Other Tools
Git | LaTeX | MySQL | MongoDB | Verilog | AutoCAD | Photoshop | Maya | Jupyter | Bash | Openpyxl | MS Office VBA

CERTIFICATIONS

Stanford Center for Health Education
AI in Healthcare (Specialization)
Prof. Laurence Baker
Prof. Nigam Shah
Prof. Serena Yeung
Prof. Matthew Lungren
Grade achieved: 100%

Courses:
- Introduction to Healthcare
- Introduction to Clinical Data
- Fundamentals of Machine Learning for Healthcare
- Evaluations of AI Applications in Healthcare
- AI in Healthcare Capstone

Stanford Online
Machine Learning

- Machine Learning

DeepLearning.AI
Deep Learning (Specialization)
Prof. Andrew Ng
Grade achieved: 100%

- Neural Networks and Deep Learning
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
- Structuring Machine Learning Projects
- Convolutional Neural Networks
- Sequence Models

Udacity
Mastering NLP (Nanodegree)
Dr. Luis Serrano, Dr. Jay Alammar

- Introduction to Natural Langauge Processing
- Computing with Natural Language
- Communicating with Natural Language

Stanford Online
Algorithms (Specialization)
Prof. Tim Roughgarden
Grade achieved: 91.9%

- Divide and Conquer, Sorting and Searching, and Randomized Algorithms
- Graph Search, Shortest Paths, and Data Structures
- Greedy Algorithms, Minimum Spanning Trees, and Dynamic Programming
- Shortest Paths Revisited, NP-Complete Problems and What To Do About Them

DeepLearning.AI
Tensorflow in Practice (Specialization)
Prof. Laurence Moroney
Grade achieved: 100%

- Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning
- Convolutional Neural Networks in TensorFlow
- Natural Language Processing in TensorFlow
- Sequences, Time Series and Prediction

Google Cloud
Architecting with Google Compute Engine (Specialization)
Philipp Maier, Brian Rice
Grade achieved: 99.3%

- Google Cloud Platform Fundamentals: Core Infrastructure
- Essential Google Cloud Infrastructure: Foundation
- Essential Google Cloud Infrastructure: Core Services
- Elastic Google Cloud Infrastructure: Scaling and Automation
- Reliable Google Cloud Infrastructure: Design and Process