RUDRAMANI SINGHA

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EDUCATION

Columbia University *New York City, NY*
Master of Science in Biomedical Engineering *Expected Dec 2023*

- Won Shardashish Interschool Fellowship, worth $50,000, nominated by Dean of Columbia Engineering
- Won Data Science Institute Scholar award for Developing AI Model Share MLOps platform
- High Performance Machine Learning, Deep Learning for Computer Vision, Competitive Programming

University of Mumbai *Mumbai, IN*
Bachelor of Engineering in Information Technology *Jun 2018 - Jul 2022*

- Distributed Systems, Computer Networks, Operating Systems, Data Science, System Administration

EXPERIENCE

Columbia University - School of Engineering and Applied Science *New York City, NY*
Research Assistant @ Computational Neuroscience lab *(PI: Nuttida Rungratsameetaweemana)* *Mar 2023 - Present*

- ***Leading representational content extraction from neural activities:*** Characterizing *latent features* of perceptual decision-making from single-channel recordings, EEGs, and fMRIs in *lower dimensions* to understand computations performed in brain
- ***Designing state space models:*** Mathematically modelling 9+ *hidden Markov models* (HMMs) in multiple state and emission conditions to identify patterns and strategies in decision-making
- ***RSA benchmarking:*** Quantifying efficacy of 10+ metrics of *Representational Similarity Analysis* (RSA) techniques on biophysically realistic RNNs trained on working memory retention; identifying strengths, limitations, and sensitivity to noise

AZYO *San Diego, CA*
Machine Learning Engineer - Intern *Mar 2021 - Dec 2021*

- ***Engineered NLP solution for explainable HTS lookup:*** Developed decision graph frameworks for *hierarchical classification* of 500+ classes in *Harmonized Tariff Schedule* (HTS) with *Q&A trace justifications* and *parallel traversals*, achieving 94% validation accuracy on supported product chapters
- ***Standardized R&D:*** Devised companywide standard MLOps platform for model logging, inspecting, and data caching, resulting in *cross-departmental model sharing* and enabling rapid development of working prototypes

CSKA Automation Services Pvt Ltd *New Delhi, IN*
Machine Learning Engineer - Intern *Oct 2020 - Feb 2021*

- ***Designed liveness detection system:*** Developed *anti-spoofing* countermeasures and authenticated 3000+ users against *presentation attacks* using a combination of *facial recognition*, *hand gestures*, and *eye movements* from live feed
- ***Refactored complete ID extraction pipeline:*** Integrated *OCR API* with *Google Vision* for up to 60% faster performance and 30% improved accuracy; created *cleanup and validation engine* to support 11+ government Identity Document (ID) formats with *Named Entity Recognition* (NER) and *REGEX*

SKILLS

- ***Tools:*** PyTorch, TensorFlow, Scikit-learn, Keras, Spark, JAX, Elasticsearch, Pandas, NumPy, Git, Flask, Django, Docker, AWS, GCP
- ***Languages:*** Python, R, C/C++, Java, MATLAB, CUDA, SQL, JavaScript, LaTeX, Markdown, HTML, CSS, Bootstrap
- ***Pipelines:*** Retriever-Reader, Abstractive Summarization, Object Detection, Image Segmentation, Question Answering (IRQA)
- ***Certifications:*** AWS Fundamentals Specialization, TensorFlow in Practice Specialization, Reinforcement Learning Specialization

PROJECTS

- Artificial Fourier Transformer to reconstruct accelerated MRI across multiple weighted sequences and species [*patent pending*]
- NeuralDecoder: Parallelized toolkit to measure and visualize representational similarities and latent features efficiently
- NeuralJAXwork: GPU Accelerated Lightweight ML Framework from Scratch with JAX and JIT compilation
- GraphWelder: High-Performance MLOps Framework for Flexible Computation Graphs in Research and Production Pipelines
- ChatGPT but it cites its sources: Retriever Augmented Abstractive Summarization in the Wild for Question Answering
- LiveCAPTCHA: In-Browser Live Challenge-Response Authentication with Face and Hand Landmarks

PUBLICATIONS & PATENTS

- R. G. Singha (2023, April 19). *Extracting representational content in deep learning models through second-order isomorphism-based tools* [Poster presentation]. Data Science Day, Data Science Institute, Columbia University. **https://rb.gy/fuowt**
- R. G. Singha et al., "*Dynamic Pose Diagnosis with BlazePose and LSTM for Spinal Dysfunction Risk Estimation,*" 2022 4th International Conference on Smart Systems and Inventive Technology (ICSSIT), 2022, pp. 1547-1552, **doi: 10.1109/ICSSIT53264.2022.9716509**
- R. G. Singha et al., "*Vehicle Speed Detection Using Multi-Branch Networks From Temporal Image Pairs,*" 2022 4th International Conference on Smart Systems and Inventive Technology (ICSSIT), 2022, pp. 301-308, **doi: 10.1109/ICSSIT53264.2022.9716386**
- C. Chauhan and **R. G. Singha.** "*Realtime Proctoring and Analysis System Using Facial, Gesture and Behavior Analysis*" **IN 202111058826**, Filed Dec 16, 2021, https://rb.gy/65e21, Accessed on Aug 21, 2023. [Online]