DANIEL RICHARDS R.

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EDUCATION

KTH Royal Institute of Technology, *Stockholm, Sweden* *2021 – 2023*

Master of Science in Machine Learning, GPA: 4.85/5.0
Highlighted coursework: Advanced Deep Learning, Advanced Machine Learning, Stochastic Differential Equations

Indian Institute of Technology - Madras, *Chennai, India* *2014 – 2018*

Bachelor of Technology in Mechanical Engineering, Minor in Systems Engineering, GPA: 8.02/10.0
Highlighted coursework: Linear Algebra, Machine Learning, Data Structures and Algorithms, Multivariate Data Analysis

WORK EXPERIENCE

• **Research Visit (Internship) - Inria Centre at Université Côte d'Azur**, Nice, France Sep'24 - Present

Work on methods to reduce the greenhouse gas emissions of deep learning models trained in a federated fashion under non-IID assumptions, correlated and heterogeneous participation, under the supervision of Prof. Dr. Giovanni Neglia

• **Thesis Worker - Scania AB**, Stockholm, Sweden Jan'23 - Nov'23

Collaborated with Scania AB for my master's thesis work. Worked on exploring deep learning architectures for Time series anomaly detection and effective ways to compress them

• **Research Engineer - Div. of Geoinformatics, KTH**, Stockholm, Sweden Jun'23 - Jul'23

Tweaked and expanded the transformer-based wildfire detection model (Y. Zhao et al. (2023)) trained on satellite images (VIIRS) to encompass new geographic regions.

• **Teaching Assistant - KTH**, Stockholm, Sweden Nov'21 - May'23

Helped in conducting tutorials, grading students and preparing assignments and their solutions for the courses Advanced Machine Learning, Artificial Intelligence and Search Engines.

• **Summer Worker - Scania AB**, Stockholm, Sweden Jun'22 - Aug'22

Created a Multilayer Perceptron (MLP) model for identifying faulty components by leveraging text and diagnostic trouble codes (DTC); identified relevant DTCs from a vast pool of thousands.

• **Data Scientist - Gyan Data**, Chennai, India Sep'19 - Jun'21

Smart Pill Manufacturing - Pfizer: Utilized **KNN** to estimate APIs/Excipient properties for pills in development; developed Mean Feed Flow predictor using **SVR**; Implemented an IPython notebook-based and **Tkinter** tool.

HVAC Fault Detection system - VOLTAS: Developed **Logistic Regression** and Rule-based system; Detected change points using **L1-trend filter**; Designed and developed web interface using **Flask** to monitor industrial HVAC systems deployed across India.

• **Business Analytics Consultant - Crayon Data**, Chennai, India Jun'18 - Sep'19

Implemented **Customer demographic** based clustering to extend recommendations increasing customer coverage to **100 %** from **30 %**; Developed tunable **recommender engine** for periodic and ad-hoc business opportunities. Utilized a combination of **n-gram** and **Cologne phonetics** algorithms for efficient entity resolution. Achieved an impressive reduction ratio of **7000:1**. Utilized Apache Spark to improve the scalability of the recommender engine to process 7 million customer transaction records, up from 300 thousand

PROJECTS

• **Unmasking Deep Learning for Time Series Anomaly Detection - M.Sc. Thesis**

Critically evaluated the need for deep learning models using **VAE** architectures to detect anomalies in time series data; brought out the need for better benchmark datasets. Investigated the effectiveness of the "point-adjusted" metric used by the research community; highlighted the need for a stable metric to help champion deep learning models.
Thesis Link: kth.diva-portal.org/smash/record.jsf?pid=diva2:1823999

• **Shenanigans with learnt representations of Music Taggers**

Inspected the quality of the GTZAN dataset (public dataset for music genre recognition) using learned representations from multiple deep-learning-based music taggers. Evaluated the clusterability of the learned representations using KNN and GMM against information provided by Music Map; Auditorily inspected the generalisability of these music taggers using out-

of-distribution data like non-Western music.
Project Link: github.com/Adhithyan8/musical-embeddings

- **Git Bi-sect: Dissecting Git Re-basin Paper**

Reproduced the "Git Re-basin" paper (Ainsworth et al.), verifying low loss barrier between deep learning models after removing permutation symmetries; conducted an in-depth analysis to explore the evolution of **Linear Mode Connectivity** as training progresses; discovered the importance of hyper-parameters on finding permutations; negated claims of methodology not working on MNIST.
Project Link: github.com/dannyrichy/git-bisect

- **Deep Learning Model Extraction Attack**

Assessed model extraction attacks on VGG and ResNet models. Designed and implemented an algorithm to identify a core set; investigated the number of samples needed to extract the model. Executed privacy attacks on the extracted model to assess the vulnerability of the victim model.
Project Link: github.com/dannyrichy/dl-model-extraction

- **Network Representation Learning**

Performed a comparative study of unsupervised network representation learning algorithms like LINE, NetMF, Node2vec, Deepwalk, and GraphSage for node classification and link prediction tasks.
Project Link: github.com/dannyrichy/graph-ml-project

- **Graphons: Efficient Graph Embeddings (Partnered with SEB AB)**

Explored the effectiveness of Graphons (Random Graph Model) as graph embedding by comparing against Graph2Vec for graph downstream tasks.
Project Link: github.com/dannyrichy/graphon

SKILLS

Python, Java, Scala, TensorFlow, PyTorch, Keras, Apache Spark, Airflow, OpenMPI, SQL, AWS, GCP, git, slurm