MACHINE LEARNING AND SOFTWARE DEVELOPER

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EXPERIENCE

ARTIFICIAL INTELLIGENCE DEVELOPER, INTACT LABS – JAN 2022 - PRESENT

- Trained RoBERTa model on call transcripts to predict reason of call.
- Implemented **masked language modelling** for further pre-training to increase f1-score by **10%**.
- Performed EDA to identify properties from metadata that improve model performance.
- Used the EDA to make the data annotation process more efficient by using regex tools to help annotators classify transcripts more effectively.
- Used the EDA to understand the distribution of our target labels to create a sampling method to statistically ensure a uniform distribution of labels during training.
- Performed **principal component analysis** to identify the caller as highly indicative of the reason of call and used that information to further improve model performance by **5%**.
- Created heuristic labelling functions to classify data. Computed the labeling propensity, accuracy as determined by weighted majority vote and pairwise correlations to train an intermediate model to label a large dataset. Used this statistically labeled dataset to train a RoBERTa model. This **mitigated the problem of scarce annotated data** for classification purposes.
- Created model monitoring dashboards using PowerBI and fetched realtime data from snowflake.

ML RESEARCHER, MCGILL ROSALIND & MORRIS GOODMAN CANCER INSITUTE – MAR 2022 - PRESENT

- Goal is to create a model to **predict whether cancer will progress** to the next stage or not using images of cell tissue (stained with different metals to make different images) (immunostaining).
- Cell identification pipeline to accurately distinguish cells across diverse tissue micro-evironments and resolve low resolution structures. Our **method outperforms the current state of the art** segmentation tools among multiple accuracy measures.
- Using the data after processing from the pipeline above, the goal is **formulated as a graph problem** and a **GNN** architecture is used to understand the spatial structures formed by cells to predict if the cancer will progress.
- A **CNN**, pre-trained on binary images, is also used to benchmark the performance of the model (each cell type is on a different channel of the image).
- **Weights and Biases** used for experiment tracking and dataset versioning.
- Initial F1-score of **~65% with less than 100 samples** of data

ML RESEARCHER, DYNAMIC GRAPHICS PROJECT UNIVERSITY OF TORONTO - OCT 2022 - PRESENT

- Goal is to **create a gaze estimation dataset** and use that to **predict when a speaker and listener will break gaze** during conversation given audio input (helpful for VR gaming and animation applications).
- Used OpenCV to detect facial landmarks from images and used those to compute head angle and extract eye images.
- Use of **multimodal CNN** to use head angle and eye images to predict gaze vector from an image.
- Used the model to create a gaze dataset using YouTube podcast videos by creating **geometric functions** to look at gaze vectors and compute the point of gaze focus on a 2d plane and use that information to determine whether gaze was being maintained or not.
- Used the gaze dataset to train another CNN model to take audio data as input and predict whether the speaker (and listener) is making gaze or not.
- Initial F1-score of 77% for gaze prediction.

CO-FOUNDER, CONNCT, JAN 2019 - JAN 2020

- Developed a web app to aid and automate work done by social media influencers, increasing engagement by **50%** for macro influencers and **100%** for nano and micro influencers. The platform also increased following dramatically. The platform focused on influencers on Instagram.
- Understanding of **Facebook's graph API** to create web app.

- Used **Google's vision API** to understand semantics of an image and Google's natural language API to read captions and comments to understand what the post is about and monitor the general sentiment of a users post and automatically remove negative discourse.
- Used **DeepAI API** to use the image and language information to formulate comments automatically to interact with users on Instagram.
- Platform created using **NodeJS** for backend and server side programming, implemented **AJAX** to buffer data before the user needed it to improve interactivity with the platform, used **MongoDB** to store account information securely, **Circle CI** for CI/CD and test coverage, **Heroku** for deployment, **Postman** for testing HTTP requests to server, **Sentry** for error monitoring and **GitHub** for version control.
- Explored many projects to help with market research, like Twint for twitter **data scraping**. This was used specifically to scrape tweets from a user that analysed source code for various applications to understand upcoming features for Instagram and get a better understanding about the direction in which the industry was moving.
- Numerous pitches to investors throughout the process. Secured an offer for **$200k**.
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CO-FOUNDER, DREAMTUNE – JAN 2020 - JUL 2020

- Web app to help public rights organisations identify and gather evidence against illegal use of copyrighted content.
- Made the process exponentially more efficient while requiring **60%** less time of the employees by working with Dataclef to create a **CRM platform** to help identify and follow up on leads.
- Created case study reports analysing the potential impact of our algorithm and found **$2.6 Billion** in lost revenue. Reports vetted by Mario Grech and SOCAN (Canada's national music rights organisation).
- **React** for frontend, **NodeJS** backend, **firebase** database, **cheerio** on NodeJS for **web scraping**, **Circle CI** for CI/CD and test coverage, **Heroku** for deployment and **GitHub** for version control.
- **Acquisition interest** from Dataclef but called off due to the global pandemic.

OTHER EXPERIENCE

- Research Assistant at the Learning and Neural Development Lab at UofT. Analysed brain data to predict when an individual formed a memory.
- Teaching Assistant at UofT for an intro to AI course and an intro to programming course.
- Quantitative Software Engineer at Spire Trading. Wrote algorithms to trade autonomously on the stock market

OTHER PROJECTS

- Neural Network style transfer in images using Cycle-GAN (Research Project)
- Security drone to escort students across campus at night (Hackathon project at Harvard. Top 5 finish)
- Virtual trainer IOS app that builds workouts based on body type (classified using a model trained with transfer learning, fine tuned on manually labeled dataset) and intended target muscles

EDUCATION

University of Toronto — Honours in the Bachelor of Science - **High Distinction**
Computer Science specialist with a focus in **Artificial Intelligence** and a minor in **Math**
Yearly GPA: 3.83 | 2.67 | 3.79 | 3.9

HACKATHONS

- May 2022, Mentor and Judge for TOHacks
- Feb 2019, Top 5 finish at MakeHarvard
- Feb 2021, Stanford TreeHacks
- Sep 2019, Elevate Tech Jam, 7th place for IoT device for WLAN throttling interface
- Sept 2018, Orbis Challenge, 5th place for AI that plays splix.io