Letter of Recommendation

It is my pleasure to recommend **Gayathri Ethiraj** for the graduate program in your institution.

I was associated with Zoho Corporation from April 2014 to November 2023 and I have worked with Gayathri on an Automatic Speech Recognition (ASR) project from her first day at the company. I directly managed her from January 2022 till November 2023 and have closely observed her work and growth in the field. From the outset, Gayathri demonstrated an impressive ability to adapt to the team's needs and swiftly began contributing to our projects.

Gayathri joined our team as an intern and quickly established herself as a valuable contributor. She demonstrated impressive versatility in handling datasets ranging from megabytes to terabytes and focused extensively on preprocessing open-source data for training and evaluation. To enhance our evaluation suite in Zoho-specific domains, she automated data collection from YouTube using *youtube-dl* and created synthetic benchmark datasets with Google ASR APIs. For audio without transcriptions, she developed a *Streamlit*-based recorder app and organized team sessions to collect real-time data, increasing evaluation datasets by **83%**. Gayathri also created a module for audio I/O, further enhancing the ASR system's functionality. Her work greatly enhanced the data quality for benchmarking and training ASR models, showcasing her technical expertise and dedication.

One of Gayathri's standout contributions was developing *PyStratus*, a Python wrapper for Zoho's internal data storage system, *Stratus*. This required a deep understanding of APIs and close collaboration with the Stratus team. She delivered an updated version compatible with the latest APIs, well ahead of the older version's deprecation and ensured timely delivery. Her work was then seamlessly integrated into *dvc-stratus*, a tool employed across teams for efficient model and dataset versioning. Additionally, she enhanced the security of these tools by implementing *OAuth* authentication in *PyStratus* and introducing user access policies. She also maintained *ZWAF*, a security web application firewall, and integrated it as middleware for the Speech Recognition system's web server based on *FastAPI*. Her work here not only demonstrated her technical depth but also her foresight in anticipating potential challenges and addressing them effectively.

In addition to her data engineering prowess, Gayathri played a pivotal role in the ASR system's post-processing module, particularly in **Inverse Text Normalization (ITN)**. She leveraged *NVIDIA NeMo*'s rule-based system and *Pynini*, mastered libraries like *Pynini*, and designed tailored grammar rules, enhancing and adding new ones, to improve ASR output's readability. Her contributions expanded support for numerical expressions, text formatting (with a focus on *profanity filtering*), and technical terms. She reduced processing time by **140x** and memory usage by **20%** by compiling rules into FAR file. To address data gaps, she collected data from different teams, generated synthetic data using OpenAI's chat completions APIs and also, led a team of **4** annotators to gather and curate high-quality datasets. She also demonstrated great potential in training neural models, conducting experiments to fine-tune the existing ASR model using ground truth transcriptions generated by Whisper, and further contributed by working on a transformer-based encoder-only model for punctuation and capitalization.

Gayathri's contributions extended beyond technical development. She built a demo application for ASR inference using *Flask*, *HTML*, *CSS*, and *JavaScript*, which was later converted into a *Linux service* for continuous operation. This application facilitated internal testing and was well-received for its usability and reliability. Her initiative in taking ownership of end-to-end tasks, from development to deployment, reflects her dedication and resourcefulness.

In addition to her technical prowess, Gayathri is an excellent team player and mentor. She guided new team members, ensuring their smooth onboarding and understanding of project requirements. I was impressed by her interpersonal communication skills. Her peers consistently relied on her for her domain knowledge and her willingness to assist. Her collaborative spirit and maturity in handling inter-team dependencies made her an indispensable part of our team.

Gayathri's ability to quickly adapt, her strong analytical skills, and her passion for continuous learning make her an outstanding candidate for graduate studies. I am confident that she will bring the same level of dedication and excellence to your program as she demonstrated at Zoho. It is with the highest enthusiasm that I recommend Gayathri Ethiraj for admission to your esteemed university. She has the potential to excel academically and contribute meaningfully to your institution.

Regards,
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