ATC-Copilot: Automatic Speech Recognition and Natural Language Processing for Air Traffic Control Communications

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Effective communication between air traffic controllers and pilots is very important for aviation safety. In this project, I use automatic speech recognition (ASR) and natural language processing (NLP) to make air traffic control (ATC) communication more accurate and efficient. Since existing ASR models cannot accurately transcribe ATC communication because of highly specialized terminology and phraseology, I need to develop my own customized ASR model. Using real ATC audio datasets, I fine-tuned OpenAI's Whisper model with the Low-Rank Adaptation (LoRA) method. Then, I selected the best-performing model and combined it with NLP to create an application called ATC-Copilot. I also experimented with different approaches to compute confidence scores for ASR transcripts and adopted the one that provides the best prediction accuracy for my app. This app is a powerful tool that reduces miscommunication between pilots and air traffic controllers, lowers the workload for aviation professionals, and improves aviation safety.

Awards Won:
Association for the Advancement of Artificial Intelligence: AAAI Student Memberships for each finalist that is part of the 1st, 2nd, and 3rd Prize Winning projects and 5 Honorable Mention winning projects (up to 3 students per project) (in-kind award / part of the 1st-3rd prize)