

Empowering AAC Users: A Systematic Integration of Personal Narratives with Conversational AI

Sayantan Pal[†], Souvik Das[†], Rohini K. Srihari[†], Jeffery Higginbotham[‡], Jenna Bizovi[‡]

State University of New York at Buffalo

[†]Department of Computer Science and Engineering

[‡]Department of Communicative Disorders and Sciences

{spal5, souvikda, rohini, cdsjeff, jbizovi}@buffalo.edu

Abstract

Communication barriers have long posed challenges for users of Alternate and Augmentative Communication (AAC). In AAC, effective conversational aids are not solely about harnessing Artificial Intelligence (AI) capabilities but more about ensuring these technologies resonate deeply with AAC user's unique communication challenges. We aim to bridge the gap between generic outputs and genuine human interactions by integrating advanced Conversational AI with personal narratives. While existing solutions offer generic responses, a considerable gap in tailoring outputs reflecting an AAC user's intent must be addressed. Thus, we propose to create a custom conversational dataset centered on the experiences and words of a primary AAC user to fine-tune advanced language models. Additionally, we employ a Retrieval-Augmented Generation (RAG) method, drawing context from a summarized version of authored content by the AAC user. This combination ensures that responses are contextually relevant and deeply personal. Preliminary evaluations underscore its transformative potential, with automated metrics and human assessments showcasing significantly enhanced response quality.

1 Introduction

Communication is essential for sharing experiences and fostering connections, yet it poses significant challenges for many individuals using AAC (Light and McNaughton, 2012, 2014). According to recent statistics, about 5 million people in the U.S. and 97 million globally are unable to use speech for communication due to conditions like cerebral palsy and ALS (Beukelman and Light, 2020). Augmentative communication technologies (ACTs) (Light and McNaughton, 2013) have been developed to aid these individuals, offering tools like eye tracking and dynamic screen navigation to facilitate communication through text and pic-

ture selection. Despite these advancements, traditional AAC solutions (Elsahar et al., 2019) often lack the depth to express an individual's personality fully, and the slow communication rates, typically less than 10 words per minute, can lead to frustration and isolation (Waller, 2019; Beukelman and Mirenda, 2013).

Traditional AAC tools (Baldassarri et al., 2014; Light, 1988; Higginbotham et al., 2007) have been instrumental in enabling communication for many, yet often lack the finesse (Pancholi et al., 2023) needed to capture the user's personal narratives and unique experiences. Recent advancements in AI, deep learning, and language models (Thompson et al., 2004; MacDonald et al., 2021; Ghazvininejad et al., 2018) offer new possibilities for creating personalized conversational aids that adapt to the user's background and evolve with their changing needs. This paper, a collaboration between computer scientists and AAC practitioners, presents an innovative approach that prioritizes personal narratives by merging modern AI's adaptability with individual user stories.

Previous studies (Sennott et al., 2019) prioritized model accuracy over adaptability in AAC systems, focusing on technical aspects rather than individuality; this highlights the need for a new approach that values personal narratives and leverages AI to reflect each user's uniqueness. In this study, we introduced a system that does not merely optimize for speed or vocabulary variety; (1) it seeks to resonate deeply with each AAC user's individuality. (2) By leveraging a conversational dialogue dataset tailored to a specific user and integrating the knowledge from the authored content, we crafted a model that outputs responses deeply rooted in their experiences. Furthermore, (3) our dual methodology—combining the finesse of fine-tuning encoder-decoder models (Kale and Rastogi, 2020) with the grounded knowledge retrieval (Li et al., 2022) of RAG—enriches the response generation process.