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## **Applicability of machine learning techniques to improve the accuracy of communication of children with isolated speech and language delay in Sri Lanka**

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Children with speech and language difficulties face a lot of inconvenience when they try to communicate with others. This study looks for the possibility to help improve their communication by integrating Machine Learning (ML) techniques to widely used picture-based communication method. Augmentative and Alternative Communication (AAC) is a popular intervention used for the treatment of speech delay, which includes exchange-based pictorial communication. Apart from the manual implementations, the mobile applications based on AAC have become popular among the interested audience, where they can place the relevant pictures instead of typing words and the pictures are spoken out by the application. The issue with the existing solutions was that the application just reads out the referents of each picture without making a proper sentence, sometimes making it hard to understand what the patient has meant, along with less support provided for local language. Main objective of this study was to explore the possibility of integrating ML techniques to the AAC based mobile application, which would be ordering the pictures placed by the patient better and predict better picture-based suggestions, increasing the accuracy of communication. In the implementation, a text classifier based on Natural Language Processing (NLP), which is a ML technique, was used to assign a class to each chosen referent. The NLP model was trained using a labelled dataset which contained referents and the labels they belong. Then an algorithm was written to reorder the pictures placed, using the referents and assigned classes. A sample of 12 children diagnosed with isolated speech and language delay was used to test the application. They were tested twice; once with the normal application and again with the enhanced application. The application was used to communicate with both their regular and non-regular communication partners. Majority out of the 12 partners were positive on the improved accuracy of the communication with the enhanced application. Previously used similar applications had not used ML techniques to enhance the accuracy of the output of the application. Categorizing the pictures had been already done; yet, new data had to be repeatedly added to the categories manually, and at another level, a meaningful sentence was not formed as the output. Findings of this research proved that integrating Machine learning techniques such as NLP, to order the output of the application making more sense, was successful in terms of accuracy and the meaning of communication.

**Keywords:** Augmentative and alternative communication, machine learning, natural language processing, speech and language delay