

Executive Summary



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1. Title of the Project: Development of Instrumental Measures for Oral Skill in Any Language
2. Date of Start of the Project: October 1, 2020
3. Aims and Objectives: To research and develop a system that reliably predicts human expert judgements of oral skill in constrained speaking contexts, realized as a complete software implementation involving both device and cloud server components for assessment/monitoring as well as language training functions. The system would be flexible enough to be easily customized to new content and even a new language and usable by diverse groups of language learners across age groups, native tongues and skill levels.
4. Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc), Patents and Publications:

Patent filed: Indian patent examination report received and response submitted in December 2021. Patent Application No. 201921041761 titled 'SYSTEM FOR AUTOMATIC ASSESSMENT OF FLUENCY IN SPOKEN LANGUAGE AND A METHOD THEREOF'.

Publications:

- (i) V.N.S. Saketh, "Mispronunciation Detection System for Read Speech Assessment", M.Tech. thesis, I.I.T. Bombay, 2023.
- (ii) Binaya Kumar Sahoo, "Detection of Prominent Words and Phrase Boundary in Children's Read Speech with Prosody Modeling", M.Tech. thesis, I.I.T. Bombay, 2023.
- (iii) K. Sabu and P. Rao, "Predicting Perceived Reading Proficiency with Prosody Modeling", Under Revision for Computer Speech and Language.
- (iv) Vaidya Mithilesh, Kamini Sabu, and Preeti Rao, "Deep Learning for Prominence Detection in Children's Read Speech", IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP). IEEE, 2022.
- (v) Kamini Sabu, "Automatic Assessment of Fluency in Children's Oral Reading using Prosody Modeling", Ph.D. thesis, I.I.T. Bombay, July 2022.

- (vi) Mithilesh Vaidya, “Assessing Comprehensibility of Children’s Read Speech with Deep Learning”, M.Tech. thesis, I.I.T. Bombay, July 2022.
- (vii) Kamini Sabu and Preeti Rao " Automatic prediction of confidence level from children’s oral reading recordings", Proceedings of Interspeech, October 2020, Shanghai, China.
- (viii) K. Sabu and P. Rao " Automatic assessment of children's oral reading using speech recognition and prosody modeling ", CSI Transactions on ICT, S.I. Visvesvaraya, pp 1-5, Jun 2018, Springer.
- (ix) K. Sabu, K. Kumar and P. Rao " Automatic detection of expressiveness in oral reading ", Special session: Show And Tell, Interspeech, Sep 2018, Hyderabad, India.
- (x) Patent filed: Indian patent examination report received and response submitted in December 2021. Patent Application No. 201921041761 titled 'SYSTEM FOR AUTOMATIC ASSESSMENT OF FLUENCY IN SPOKEN LANGUAGE AND A METHOD THEREOF'

Prototype and Deployment:

1. Interaction with Kendriya Vidyalaya schools: Based on an introduction to the Deputy Commissioner of KVS Mumbai region, the IITB team was invited to conduct oral reading assessment for the students of Classes 3,4 and 5 across 10 KV schools in Maharashtra and Goa regions in September 2022. This necessitated the porting of the App to mobile phone, a device that was far more accessible for the school pilots compared to a tablet. A lot of development work was completed very quickly and a pilot involving oral reading recording of 2500 students across 10 schools was completed in September 2022. Level-appropriate texts were selected from Reading cards stories from the English 400 Reading Programme by EFLU. Teacher training was conducted through a hybrid workshop as well as Whatsapp group instruction. Individual as well as cohort reports were prepared. A second large exercise (considered as an Endline) took place for the same cohort in March 2023 at the end of the school year. The cohort reports demonstrate the impressive potential of such exercises for benchmarking and monitoring. Finally, an across-country 40 schools Baseline was carried out in collaboration with KVS HQ in the month of May.

At the request of the Joint Commissioner (Academic) of KVS HQ in New Delhi, a third large exercise is in the planning stages. This (termed FLN Readiness Testing) is expected to involve all Grade 3 students from all the 1200 KVS schools in the country. This time, both English and Hindi reading assessments will be conducted. Both baseline and endline testing will be conducted within the 2023-2024 school year, in keeping with Govt. of India FLN mission guidelines. It is expected that the impressive cross-section and size of the sample will be useful to obtain the Indian reading benchmarks that are unavailable currently.

2. Interaction with WPP CSR Foundation India for developing an oral reading assessment product for their skilling program in English communication. There is a special emphasis on evaluation of reading fluency with emphasis on expression (prosody). A facilitator-centric app (‘Happy Lingo’) has been developed as part of the

product ecosystem. Field data collected over 6 months from WPP schools has been processed and reports for 1200 students from 10 schools was made available to WPP. WPP Foundation also commissioned a research report on marketability of the App by a social research agency. The report provides clear evidence of the need for the oral assessment product and recommends additional components such as benchmarks for interpretation of scores and intervention strategies to be packaged with the App.

3. Collaboration with Pratham Education Foundation. Our auto assessment codes forpara and story have been installed on the Pratham cloud infra. Front-end app has been developed by Pratham Digital team. The submitted audio is processed and scoring parameters are returned for validation by the facilitator. Two pilots have been conducted with Parakh in UP/Rajasthan and Pune respectively during the period February-March 2022. Different usage scenarios, response time and assessment outcome accuracy (with reference to the corresponding facilitator judgment) were documented. Based on the report, Pratham plans to release the Parakh app on the Playstore for public use. An agreement with IIT Bombay to facilitate use of the IITB scoring IP in the released Parakh app remains under discussion.

5. Concluding remarks

The project has progressed well. Judging by the recent pilot deployments with the KVS schools that also look promising in terms of further growth of engagement. The insights that are coming our way from the now increased interaction with teachers and school administration are helping to prioritise directions for future development. The focus is now on the Hindi and English language reading assessment tools, and possibly also developing technology-aided learning elements. We are hoping to replicate the methodology with more languages including Marathi. We are looking actively for more implementation partners. The support from the Fellowship has been enabling and is greatly appreciated.