**Support ANU students’ ability to speak a foreign language intelligibly using educational technologies**

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**Body:**

***Motivation:***ANU offers an outstanding variety of programs for Australia's next generation of language leaders. Close to 30 languages are taught by three schools/centres at ANU, and on campus and/or innovative online courses are offered from beginning to advanced levels. Students have the opportunity to interact one-on-one and in small groups with their lecturer. One problem we are looking to solve is the challenge of providing timely and detailed feedback in person to students on their pronunciation. We aim to investigate the potential of Educational Technologies to better support students’ learning of languages at The ANU.

***Approach:*** Speech recognition technologies, such as Duolingo or ElsaSpeak, use second language acquisition modelling and speech recognition to predict errors and provide coaching and individualised feedback from a large corpus to improve pronunciation accuracy. By adapting an existing Arabic pronunciation application we aim to improve prosody and speech patterns of ANU students learning beginning Arabic.

**Keywords:** Artificial Intelligence, Computational Linguistics, eLearning, Learning Apps, Machine Learning, Natural Language Processing, Pronunciation, Software Design, Speech Recognition, Second Language Acquisition, User-Computer Interface

**Goals:** The project methodology consists of applying Artificial Intelligence (AI), Computational Linguistics, Educational Technology (EduTech), Learning Apps, Machine Learning (ML), Natural Language Processing (NLP), Software Design, Speech Recognition, and User-Computer Interface to existing technology to better meet the needs of individual ANU students studying a second language. Multi-modal aspects of combining linguistics, second language acquisition and visual content can be considered as part of the research process. The project is interdisciplinary and deliberately connected to authentic data and real-life applications. Both experimental and theoretical work, in other words, applied and fundamental research, go hand in hand with their emphasis depending on the student’s individual interests and expertise.

**Requirements:** This project will appeal to students with excellent skills in experimentation, programming, and teamwork. The preference is on students who have finished/are taking the units of Artificial Intelligence/Machine Learning in The ANU or similar and have an interest in EduTech and linguistics.

**Background Literature:** See, for example, the following recent papers:

Fudholi, D., & Suominen, H. (2018). The importance of recommender and feedback features in a pronunciation learning aid. In The 5th Workshop on Natural Language Processing Techniques for Educational Applications (NLPTEA 2018) at The 56th Annual Meeting of the Association for Computational Linguistics (ACL 2018). Retrieved from http://www.aclweb.org/anthology/W18-3711, last accessed on 15 August 2018.

Suominen H., Zhou L, Hanlen L., Ferraro G. (2015). Benchmarking clinical speech recognition and information extraction: New data, methods and evaluations. *JMIR Medical Informatics* 3(2), e19. Retrieved from <http://medinform.jmir.org/2015/2/e19/>.

Yadav, S. (2016). The Kano model — A tool to prioritize the user’s wants and desires. Interaction Design Foundation. Retrieved from https://www.interaction-design.org/literature/article/ the-kano-model-a-tool-to-prioritize-the-users-wants-and-desires.

**Gain:** This student project is a part of the activities of The Australian National University (ANU) (College of Arts and Social Sciences (CASS) Educational Development Studio, Centre for Arabic and Islamic Studies (CAIS), the College of Engineering and Computer Science (CECS) and the Australian National Centre for the Public Awareness of Science CPAS)) and Data61 in Canberra, the capital of Australia.

The OECD Regional Well-Being Report 2014 evaluated Canberra as the most liveable city in the world.

The ANU is ranked #1 in Australia and within the top-25 universities globally (QS World University Rankings 2016-17), and is further distinguished by an outstanding record for student satisfaction and graduate employability. For the field of research (FOR) code of Artificial Intelligence and Image Processing, applicable to ML and NLP, under Information and Computer Sciences, The ANU has obtained the top 5 out of 5 score in the Excellence in Research for Australia (ERA) evaluations in 2015-2016.

The NLP Team is experienced in developing powerful low-cost techniques to free-form text them into structured representations. Our deep and transfer ML methods are able to use less than a hundred expert-annotated sentences to achieve performance comparable to the state-of-the-art systems, initialised with ten times more data. Similarly, our language processing methods have been among the finest elite in the ALTA, CLEF, and TREC shared tasks on automated understanding, use, summarisation, and translation in difficult genres of “Doctors’ Latin” in electronic health records and “Lawyers’ French” in patents.

**Expression of Interest:** Submit an expressional of interest by sending a CV, transcripts and 1-2 pages of research plan to Associate Professor Hanna Suominen hanna.suominen@anu.edu.au by 8 February 2019.