Msc projects to be supervised by Prof. Kin Hong Wong 2019-20, 2019 May 13 b

Project title 1: Artificial Intelligent (AI) based Virtual Reality (VR) applications: Tensor flow is a very popular tool for machine learning and artificial intelligence, one very successful example is object recognition (<https://www.youtube.com/watch?v=4eIBisqx9_g>). In this project, we will explore how to combine neural network based object recognition and virtual reality in useful applications (e.g. <https://www.youtube.com/watch?v=WKcokBd5TJM>). The project should involve learning tensor flow, python programming and the use of VR head mount devices (<https://www.youtube.com/watch?v=MAqFQwvsce8>) .

Project title 2: English-to-Chinese translation using machine learning: The use of deep learning in machine translation has been shown to outperform pervious approaches as reported in the recent literature. In CUHK, we have successfully built an experimental sentence-based English-to-Chinese machine translator using the sequence-to-sequence approach and we would like to improve the system performance in the coming year. The student is expected to study the method of machine learning and the use of the sequence-to-sequence approach (<https://github.com/tensorflow/nmt> ) for the project. The expected result is a high performance English-to Chinese machine translation system with superb accuracy.

Project title 3: Instant machine translation of foreign words: We propose to design a wearable device that can perform instant Optical Character Recognition (OCR) on what the user is reading. Assume the user is reading a paper of text which contains some foreign words that he/she doesn’t understand. We propose to use computer vision method to track the eye ball and determine which word the user is reading, hence we perform OCR on that word and send its translation through a display device or produce the synthesized speech. We may have to use the OCR tool (<https://github.com/tesseract-ocr/tesseract>) and OPENCV (<https://opencv.org/>) for this work. A previous similar approach has been achieved by us using the finger as the pointing device and the demo can be found at <https://www.youtube.com/watch?v=j7t7a8maBv0>. We intent to extend this work by making it easier to use by just using the eye gaze as the input.

Project title 4: Title: Finger gesture based user interface: A new interactive sensor by Google ATAP (<https://youtu.be/0QNiZfSsPc0> ) has been developed, which may revolutionize the future of user interface design. For example, complicated finger gestures can be turned into rich and expressive commands for computers. In this project, machine learning is proposed, hence large number of gesture and command pairs are required during training. Then, it is hoped that system can recall the command accurately when an unknown input gesture is received. As for the work, software drivers for the hardware are available from the company; therefore very little hardware development is needed. The main task is concentrating on the design of the learning system and programming using Tensor flow (<https://www.tensorflow.org/>). It is a good exercise for those who would like to understand more about machine learning.