Project proposal - Object Recognition and Computer vision

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1 Chosen topic

We have chosen the topic : A.3 Instructions for assembling simple lego objects.

The advent of augmented reality tools such as Microsoft Hololens have made possible many interesting applications that augment the visual experience of the user providing relevant informations and distractions. Across the web, one can find lots of tutorial videos for performing a certain task be it assemble a furniture, prepare a meal, change tire in addition to DIY videos. These explanations can really be enhanced through augmented reality technology by overlaying instructions in the view of Hololens for example in order to adapt the tutorial to the real world's configuration.

We propose to tackle the problem of providing instructions for assembling simple LEGO set. This simple game-related problem is a good start in manipulating and recognizing 3D objects from a head-mounted camera. Our goal is to create a assistant that is able to recognize the state of the LEGO mounting problem and suggest the next step by blending virtual movement on the reality perceived by the player thanks to Hololens.

Some researchers already worked on the problem of LEGO brick identification and retrieval in realtime from 2D images[2].

2 Plan of work

- GOAL: Implement an interactive assistant that helps solving/assembling a LEGO set.
- We assume the knowledge of the set of sequences required for the assembly, this can be either supplied by LEGO from the manual, or can be deduced from tutorial videos, as was done in the paper [1].
- From a head mounted camera, recognize LEGO part to be moved and its destination and display a hint of the movement overlaid on the hololens.
- Recognize similar/equivalent parts to be moved

3 Operational organization

3.1 Groupe members

- Othman Sbai
- Pierre-Alain Langlois

3.2 Plans for work sharing

References

[1] Jean-Baptiste Alayrac, Piotr Bojanowski, Nishant Agrawal, Josef Sivic, Ivan Laptev, and Simon Lacoste-Julien. Unsupervised Learning from Narrated Instruction Videos. *arXiv:1506.09215 [cs]*, June 2015. arXiv: 1506.09215.

[2] Leendert Botha, Lynette Van Zijl, and Mcelory Hoffmann. *Realtime LEGO Brick Image Retrieval with Cellular Automata*. July 2009.