SEGMENTATION STABILITY: A KEY COMPONENT FOR JOINT ATTENTION

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ABSTRACT

It is now well established that joint attention is a key capability for socialy interacting robots. In the new Talking Robots experiment that we have just started, following a successful reimplementation of the Sony 's Talking Heads experiment on Aibo ERS7, we have two robots interacting to evolve a shared repertoire of synchronized behaviors, or "games", leading to a dynamic version of the Talking Heads where the interaction protocol, or language game, is not predefined in the agents. For these experiments in particular, it is essential that the two robots can establish a joint attention and share a common representation of their surrounding environment, while they are looking at the same scene. When using segmentation algorithms, a slight change in the view point, or even the residual camera noise, is enough to significantly change the result of the image partition. We have developped an original measure to assess the stability of a segmentation algorithm and we have used it on a set of algorithms to automatically determine the most stable partition for a given scene. This approach is different from classical methods used to estimate the quality of a segmentation algorithm, where the result of the algorithm is compared to an ideal perfect segmentation done by hand. In our approach, the measure is done automatically, involves only stability considerations and could lead to interesting improvements whenever joint attention is required.

We quickly present in the poster the background of the Talking Robots experiment and why joint attention and image segmentation stability is an important issue for us. We introduce then two stability measures and show some results on natural scenes from our experiments in the lab and test scenes used to control image parameters. The influence of several image caracterizations (noise, number of objects, luminosity,...) is carefully reviewed. A general method of algorithm switching is introduced and used in the experiment. We show how this method significantly improves the convergence speed and conclude on the genericity of our approach to facilitate joint attention.