

Modelling Attention Based Priority Maps

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INTRODUCTION: Priority maps are theorized to guide the allocation of attention based on stimulus dependent as well as task dependent factors in the environment. Such prioritization can, hence, guide eye movements to specific locations in space. For the purpose of this project we look at goal directed behavior in the context of Gibson's affordances. We specifically include affordances such as grasp, cut, scoop, contain, pound and wrap-grasp of common household tools. So, given a particular task (e.g. grasp), a priority map would highlight the object parts in a scene with the said affordance that would fulfill the task requirements. Alternatively, in a free viewing task, due to a lack of a specific task description, the priority map would be represented as an average over all affordances in the scene weighted also by perceptually salient features such as brightness, contrast, etc. In this case, we hypothesize that objects that have multiple affordances would be more 'salient' compared to others. Inspired by this, the aim of the present study is to model a priority map given several objects with various affordances.

METHOD: We use a VGG-16 Fully Convolutional Network to perform a semantic segmentation on images of tools based on the affordance of the parts of the tools. For each image we produce an Affordance Map which predicts the regions in the image that have a particular affordance. This affordance map is combined with a classical graph based saliency map which results in the final priority map which represents the most task relevant and salient aspects in a given scene.

RESULTS & CONCLUSION: Here, we present an architecture that builds upon classical saliency maps that are based purely on bottom up perceptual signals. Additionally, these priority maps not only model which objects are more salient for a given task but also which parts of the object are fixated on. Consequently, this project lays the groundwork for further research into task relevant signalling in target selection.