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A METHOD OF CALCULATING SALIENCY OF IMAGES AND OF OPTIMIZING EFFICIENT DISTRIBUTION OF IMAGE WINDOWS

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Abstract. *In this paper, we propose a method of calculating the saliency map of an input image. In this method the saliency gets higher in the areas where the image features are different from those in the surrounding areas and where the features are unfamiliar. We also propose a method to apply the idea of calculating the saliency to the problem of determining the most efficient distribution of image windows to acquire the information. This distribution might be considered to correspond to the distribution of attention. We conducted some experiments. In the experiments the saliency model is applied not only to a still image but also to a moving image and it is shown that the saliency gets higher where the features of movement are different from other areas and where the features are unfamiliar. It is also shown that a definite number of image windows to acquire the information can be efficiently distributed owing to the local image features.*
Keywords: Visual attention, Saliency, Principal component analysis, Distribution of windows, Asymmetry of visual search

1. **Introduction.** Humans do not process whole areas of an input visual image uniformly, but he usually focuses his visual attention on a limited area. Visual attention has been studied through psychophysical experiments of visual search, and based on them several models on visual attention have been developed. Also, some of these models have been applied to computer vision.

Treisman and Gelade [1] proposed a model of visual attention, so called the Feature Integration Theory (FIT). This model states that early vision is divided into two processes, the pre-attentive and the attentive processes. In the pre-attentive process primitive features of a visual stimulus such as color and orientation are processed in parallel. In contrast, the attentive process proceeds sequentially to integrate these primitives only when attention is focused on that area. Wolfe [2] proposed the guided search model which suggests the saliency map is obtained by combining bottom up feature maps and top-down directives. In this model the saliency map is generated as a weighted combination of feature maps where the weights are influenced by top-down directives.

Koch and Ullman [3] suggested a Winner-Takes-All type neural network model, which calculates the location into which attention should be shifted. Later, Itti and Koch [4] revised this model to calculate a "saliency map", which topographically codes for local conspicuity over the entire complex scene. The saliency map model has been applied in several cases for years. Itti and Koch [5] proposed to apply the saliency map model to