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Abstract of Dissertation:

Behavior Adaptive and Real-Time Model of Integrated Bottom-Up and Top-Down Visual Attention

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Visual attention is an important component of natural vision that helps it to optimize the amount of data that reaches the brain for detailed processing. Computational models of attention attempt to perform this filtration for the machine vision systems. The work presented in this dissertation proposes a region-based approach for modeling visual attention as an alternative to the other existing paradigms. The proposed model integrates bottom-up and top-down pathways of attention into a single architecture and makes combined use of these pathways under different visual behaviors. In order to obtain real-time results on mobile vision systems new faster algorithms were developed for feature extraction and saliency computation. The innovation in terms of top-down attention is the creation of fine-grain saliency maps for visual search of a given object. In the proposed maps high saliency is given to regions that have more feature similarity with the search targets. The proposed model produced valid results and has shown good performance in comparison to other available attention models hence this research has opened new directions for investigations in this field that can lead to the ultimate target of biologically plausible machine vision.