Attention is More Important for Visual Cognition and Reasoning Than You Think

John K. Tsotsos
York University

I will present a view of the breadth of activities, recently completed, ongoing or just hot off the presses, in my lab. The menu includes research projects in visual cognition, autonomous driving, visual psychophysics, active vision, visual saliency, eye fixation control and more. But that is not my main goal. Believe it or not, there is an underlying theme that connects all of it, whose presentation is my main point. That theme is that attention is a far more important player in how humans perceive, reason and react to visual stimuli than has been broadly appreciated, particularly in computational models.  In our view, attention is the process by which the brain controls and tunes information processing, and this control enables functional generalization.  Our work in developing a theory of attention has always had as its primary goal the ability to make testable predictions for new knowledge of human visual processing, and in this regard, we have been quite successful.  However, hand in hand with this goal has been the goal of developing a computational embodiment of the theory. As we look more and more into real-world scenarios and problems, this reveals a broader set of human abilities that must be examined. This predictive power coupled with the broader functionality points in the direction of new computational approaches.