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A new imaging architecture and an alternative interpretation of the structure of the human retina

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ABSTRACT OF THE TALK

A new imaging architecture and an alternative interpretation of the structure of the human retina Abstract A new biologically inspired imaging framework will be presented, which uses sensor motion in a constructive way, contrary to most current imaging techniques. In addition to measuring light intensity, the spatial derivatives of the scene are estimated by measuring the temporal derivatives of the output of the vibrating photoreceptors. This is inspired from the fixational eye movements of the human visual system. When motion is known, these measured spatial derivatives can be used to improve the quality of the intensity image, as well as for object and pattern recognition tasks. This image reconstruction is based on integrating the derivatives while using the measured intensities as integration constants. The results of the imaging framework and of the reconstruction step are high quality images of the light intensities and of its spatial derivatives, which is relevant for further scene understanding. The advantages and the potential of this new imaging framework will be shown using simulations, and the implications on the physiology of the eye and the psychology of mind will be discussed.