ELSC-ICNC Seminar: Hedva Spitzer

December 6, 2012

On the topic of: "Visual adaptation mechanisms of the first and second orders and their algorithmic applications to image processing (including medical images)"

ELSC & ICNC cordially invite you
to the lecture given by:

**Hedva Spitzer**
School of electrical engineering, engineering faculty, Tel Aviv University

On the topic of:

"Visual adaptation mechanisms of the first and second orders and their algorithmic applications to image processing (including medical images)"

The lecture will be held on Thursday, December 6, 2012
at 17:00, at ELSC-ICNC: Silverman Bldg., 3rd Wing, 6th Floor, Edmond J. Safra Campus

Light refreshments at 16:45

**Abstract:**

The appearance of a patch of color or its contrast depends not only on the stimulus itself but also on the surrounding stimuli (induction effects and adaptation mechanisms). A comprehensive computational physiological model is presented, to describe chromatic adaptation of the first (retinal) and second (cortical) orders, and to predict the different chromatic and achromatic induction effects. The adaptation of the first order succeeds to predict also the color constancy effect. The second order of the proposed adaptation mechanism succeeds to predict the automatic perceived inhibition or facilitation of the central contrast of a texture stimulus, depending on the surrounding contrast. The two suggested adaptation mechanisms (the first and the second orders) are modeled originally as gain control mechanisms based on the "curve-shifting" effect, that is the transition from one response curve to another. This transition is resulting from a change in the light intensity (or color) of the local receptive field and its remote area, to obtain a higher gain in the new light intensity. This computational model applied to several computational algorithms for: color constancy and companding HDR (High dynamic range) images, which including natural visible and invisible regions. The companding algorithm for medical images includes x-ray images, such as CT, mammography and roentgen images and MRI images. Computational components from the adaption of the second order applied as a tool for detecting and enhancing textures at IR and mammography images. We have developed a recent algorithm for commanding HDR images, which is based on multi-scale paradigm and performs contrast enhancement, due to a different suggested visual adaptation mechanism. The new multi-scale companding algorithm is a lower complexity method,
compared to our previous algorithm, while yielding better results at companding natural, IR and medical images.

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