SPEAKER:

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DATE:

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TIME:

14:15 - 15:15

LOCATION:

Heriot-Watt University, Earl Mountbatten Building; room 1.55

TITLE:

Illusory gloss and velvet shapes

ABSTRACT:

In this talk I'll discuss some of our recent findings concerning the

 interaction between light, shape and reflectance properties. Humans

 perceive the shape and material properties of objects around us with

 surprising ease, although computationally this task is impossible. The

 visual system does not magically know the solution of this impossible

 task, it is merely not aware of the incorrectness of its percept.

We recently found a compelling perceptual error for material perception.

 When Brownian surfaces are rendered using a Lambertian BRDF, observers

 perceive an illusory gloss under certain parameter settings of the surface geometry and illumination direction. The initial rationale behind this study was based on the hypothesis of Motoyoshi et al.

(2007) that the skewness of the luminance histogram is diagnostic for gloss perception. However, our results could not fully be explained by this hypothesis. We found that the geometry-light transformation that maximally influenced the illusory gloss resembles the bas-relief transformation (Belhumeur et al. 1997). This transformation contains a generally neglected albedo transformation which in our case induces illusory highlights on the surfaces.

The perceptual interaction between shape and reflectance properties is two-way. To understand the influence of reflectance properties on shape perception we compared the subjective reliefs of (photographed ) matte and velvet shapes. We found that velvet shapes were perceived less accurate than matte shapes. Furthermore we found that velvet shapes were perceived more flat than matte shapes. We show that a Lambertian prior could be responsible for this effect. Up to now, there is little known about material priors, in contrast with the well know shape (convexity) prior and illumination (light-from-above) prior.

If time permits, I will furthermore give a short overview of new methods we are currently developing to measure the geometry of pictorial space.

Currently there are quite a few methods for measuring pictorial relief, but pictorial spatial relationships between objects has largely been neglected. These methods can be used to quantify depth perception of natural scenes under various conditions. For example, we can quantify the perceptual improvement when observers use stereo information.