Construction of Flexible Vision Model

Satoshi Shioiri, Ichiro Kuriki

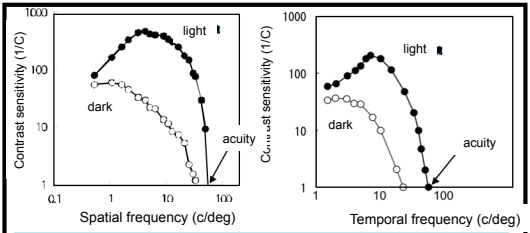
Early vision can be regarded as an image analyzing process and modeled as a feature analyzer. We will develop a vision model that is used to evaluate images and visual environments. The model is flexible so that it can be adapted to individual differences, including aging effect easily.

Image appearance varies with variety of factors. Spatiotemporal conditions, color characteristics, visual field, illuminant conditions, color deficiency, stereo anomaly, aging.

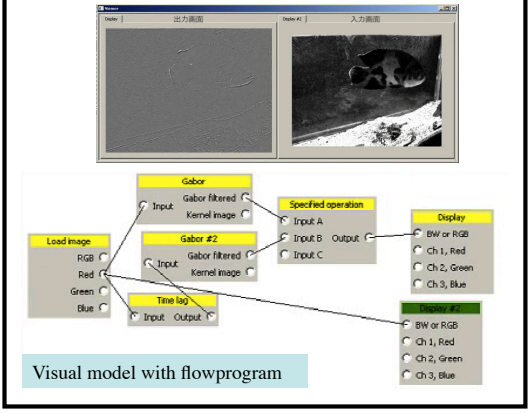
To evaluates quality of images and visual environments, we built visual model with subunits. Subunits include cone units, retina units, spatiotemporal filter units, motion detection units, disparity detection units. Using individual characteristics of visual functions and environment factors, visual quality of images and environments is estimated.

Related visual characteristics :

Spatiotemporal frequency characteristics, color characteristics, effect of illuminant levels, motion perception, depth perception, eye movements, visual attention, vision for action.



Spatiotemporal characteristics depends on illuminant level



Visual model with flowprogram

Construction of Flexible Vision Model

Satoshi Shioiri, Ichiro Kuriki

Core technology :

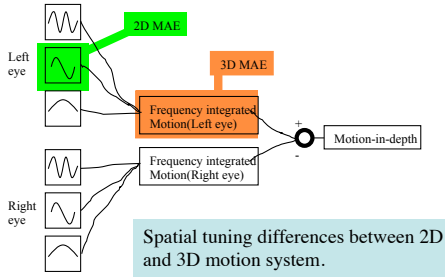
*Psychophysical techniques: measurements of visual functions with behavioral responses
*Physiological techniques: measurements of visual functions with fMRI and EEG
*Image processing model of visual functions with subunits of cone system, color channels, spatiotemporal filter units, motion units, stereo units and so on.

Features:

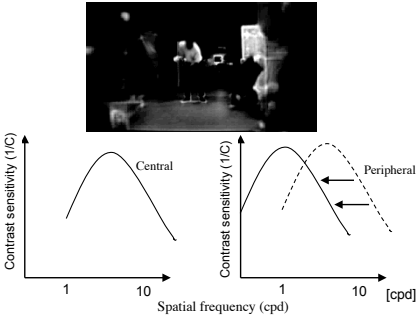
*mimic human vision based on psychophysics.
*consider environments and visual adaptation.
*toward the condition open to public,

Project period and budget:

*for an individual problem:
3 years and 10,000,000 yen/year for a given problem (e.g. estimation of a 3D display).
*for the final visual model:
15 years and 10,000,000 yen/year.



Spatial tuning differences between 2D and 3D motion system.



Visual attention model with peripheral characteristics