Visibility estimation of rotationally sampled super-resolution display by use of PredNet

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This paper proposes a novel visibility estimation method of subjective super-resolution display by use of a deep neural network. Subjective super-resolution display is an information display method to present a higher resolution than that of a high frame-rate LED display. In the subjective super-resolution display, sampled pixel information is displayed at a high speed on the LED panel, resulting in the perception of an image with a higher resolution than the actual physical number of pixels. The purpose of this study is to clarify whether a deep neural network can be used to estimate the visibility of subjective super-resolution displays composed of rotational sampling.

We used Predictive Coding Network (PredNet) for experiments. PredNet is a deep neural network built for estimating human perception, and imitates the process of prediction in the cerebral cortex of the human brain. PredNet has been proposed as a model for learning generic features and predicting future images from given video images. After training the network using video camera images of natural scenes, the constructed PredNet was used to predict the rotation-sampled subjective super-resolution display from the video images of the subjective super-resolution display. The prediction was incorrect when the number of input images was small, but as the number of input images was increased, the prediction accuracy was improved.

For the estimation of visibility using PredNet for rotation-sampled subjective super-resolution displays, the prediction results from the input image show that it is possible to predict one frame ahead with an accuracy that enables the discrimination of characters.

Short biography:

Kaito Shimamura is a second-year student at the Graduate School of Regional Development Science, Utsunomiya University. He is working the estimation of visibility for subjective super-resolution displays using PredNet.