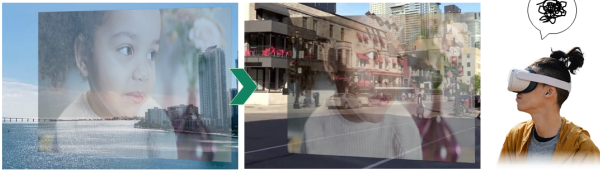


Abstract

The visibility of an image semi-transparently overlaid on another image significantly varies depending on the content of images. This makes it difficult to maintain desired visibility when image content changes. To tackle this problem, **we developed a perceptual model to predict the visibility of arbitrarily combined blended images**. Specifically, we clarified that the influence of each feature on the overall visibility depends on the distribution of features in the presented content, such as fineness and colors. Using the perceptual model that incorporates this effect, **we achieved better control on the visibility of blended images than existing techniques**. As AR technology matures, there will be more and more situations where information is displayed semi-transparently across our entire visual field. **Our technique will make it possible to maintain a comfortable visibility level** for such information. It also enables more intuitive control of visibility when blending images with a video editing software.

Visibility of blended images

In media that cover the entire field of view (e.g., AR/VR), image information often needs to be displayed semi-transparently.

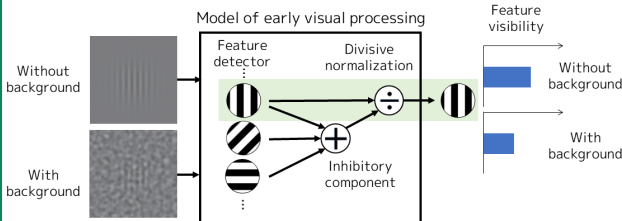


It is difficult to maintain constant visibility in situations where image content and background varies.

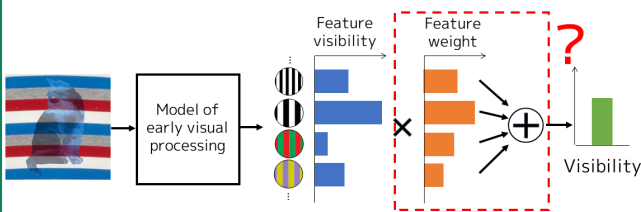
➔ A model that can accurately predict visibility is required.

Visual mechanism related to visibility

The phenomenon in which the visibility of image feature (e.g., fineness or color of patterns) is reduced by the background can be explained by the **inhibitory mechanism** in the visual system.



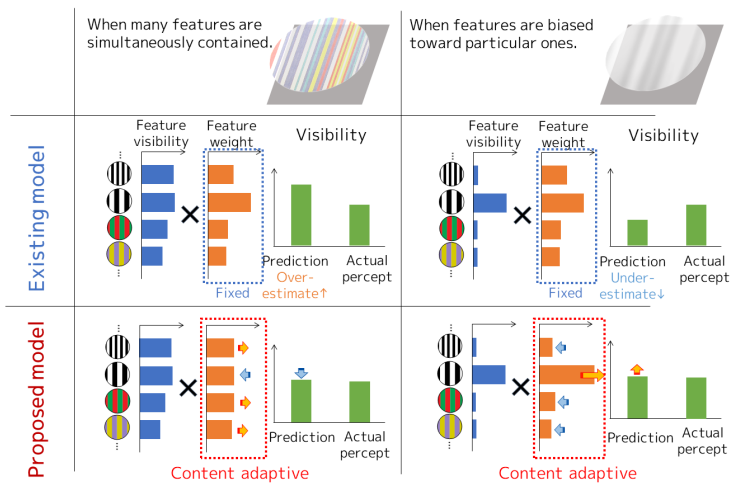
It has not been well understood how the visibility of each feature contributes to the overall visibility when many features are included at the same time, as in natural images



Technical point 1: Content-adaptive feature aggregation

Existing models Weights each feature with a predetermined value.

Proposed model Adaptively adjusts the weighting of each feature based on the distribution of features in the displayed content.

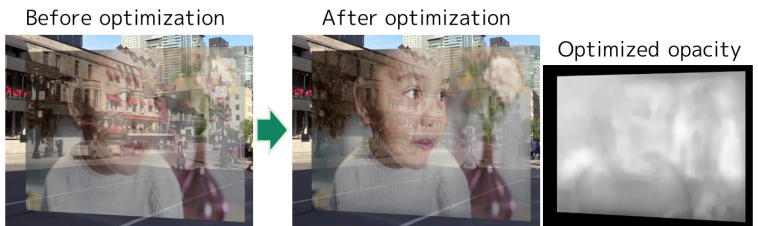


Existing models tend to **overestimate visibility for images with many features** and **underestimate visibility for images with few features**.

The proposed model can **predict visibility with significantly higher accuracy!**

Technical point 2: Visibility-based image blending

Automatically optimizes image opacity to maintain **user-specified visibility levels**.



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- [2] T. Fukiage, T. Oishi, "Perception-based image blending based on content-adaptive visibility predictor," in *Proc. Special Interest Group on Computer Vision and Image Media (CVIM)*, Vol. 229, No. 45, pp. 1–8, 2022 (in Japanese).

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