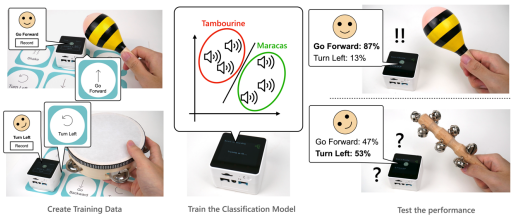
Instructor Name	Yusuke Sugano, Associate Professor	Laboratory Location	Institute of Industrial Science	Research Area	Computer Vision, HCI

In our laboratory, we conduct research activities that span multiple fields, including computer vision, machine learning, and human-computer interaction. With the rapid development of large-scale foundation models, we can now envision an era where AI could replace conventional incremental improvement research. However, in such an era, research that takes truly creative steps beyond merely improving metrics on existing benchmarks is increasingly important. Addressing diverse challenges in the real world requires a broad perspective on the problems that exist between humans and machines/AI, and generating original insights, however small, is becoming an essential skill required of humans, not just in research. Through the design and evaluation of intelligent systems that include user interaction, we aim to realize intelligent systems that are more open to people and society. We welcome students who have curiosity to expand their knowledge and interests across various research fields, and who can work together on new themes with a playful spirit.

User-Participatory Computer Vision and Machine Learning

When using image recognition and machine learning-based systems in everyday living spaces, pre-trained models and prompt engineering alone are often insufficient to fully meet user requirements. The design of physical interfaces that allow machine learning beginners and non-specialists to understand and operate intuitively is becoming particularly important. We design interactions between humans and machine learning models, including mechanisms to naturally acquire training data for adaptation to environments and people, beginner-friendly machine learning UIs with tangible operational feel, and intuitive interfaces for users to train their own recognition models. Through adaptive machine learning algorithm design and interface development emphasizing physical operability, we are taking on the challenge of realizing intelligent systems that anyone can use effectively.



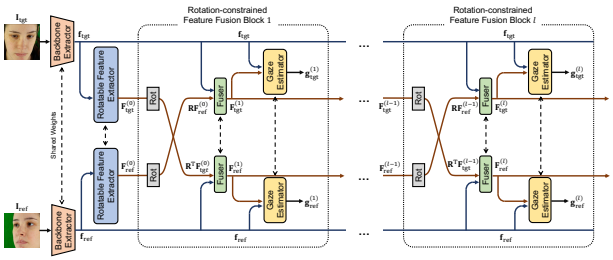
Interactive Machine Learning

Gamified System for Gaze Estimation Training Data Collection

Vision-based User Understanding and Gaze Estimation

Technologies for recognizing human states, such as gaze and behavior, have become one of the major application areas of computer vision. In our laboratory, we conduct research on person recognition and user understanding using computer vision and machine learning technologies. For example, by recognizing where people are looking in an environment, various applications can be realized, such as estimating internal states related to attention and flexible information presentation according to human attention. Conventional gaze estimation methods primarily required specialized hardware, which limited their range of applications, but we are developing high-precision gaze estimation methods using only camera images through large-scale pre-training with massive facial image datasets and efficient transfer learning. Aiming for flexible interaction through cameras, we are also working on various image recognition challenges.

Gaze Estimation via Large-scale Pre-training



Multi-view Appearance-based Gaze Estimation

Please feel free to contact Yusuke Sugano <sugano@iis.u-tokyo.ac.jp> for questions and inquiries.
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