Multimodal Interface for the Perception of Visual Data by Blind Users

A real-time multimodal image perception system converts visual scientific data into audio, haptic, and vibrotactile feedback, enabling greater accuracy and performance for visually impaired professionals in lab environments.

At present, if we look at blind or visually impaired (BVI) people, there is no suitable substitute technology to enable this population to interpret visual scientific data from lab experimentation in real time, such as performing light microscopy, spectrometry, chemical reactions, and using other scientific instruments. Current technologies for this purpose include tactile paper, which is limited because it is not real time, has to be made in advance, requires more staff, and does not allow independent work for blind students.

To address this challenge, Purdue University researchers developed a real-time multimodal image perception system to transform scientific data to something more useful. Image features such as size, color, shape, intensity, location, texture, and opacity are individually mapped through three different sensory channels of hearing, haptics, and vibrotactility. Experimental results have confirmed that this real-time approach provides greater accuracy in recognizing and analyzing objects within images compared to tactile papers. Participants have also shown better analytic performance with this technology compared to other one-sensory standard interfaces. Although this technology may take more time when exploring an image, it also allows higher accuracy during the actual analysis of that information.

Thus, this technology has potential use during lab experimentation for BVI people, which would greatly enhance information interpretation. It would allow advancement in careers in medicine, biology, chemistry, and others alike that has so far been restricted for this population.

Advantages:

-Real-time interface

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Category
Artificial Intelligence & Machine Learning/Computer Vision & Image Recognition
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

Authors
Bradley S Duerstock
Juan Wachs
Ting Zhang

Further information
Patrick Finnerty
pwfinnerty@prf.org

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-Multiple image features

-Three sensory channels

Potential Applications:

-University, government, and corporate labs

TRL: 4

Intellectual Property: