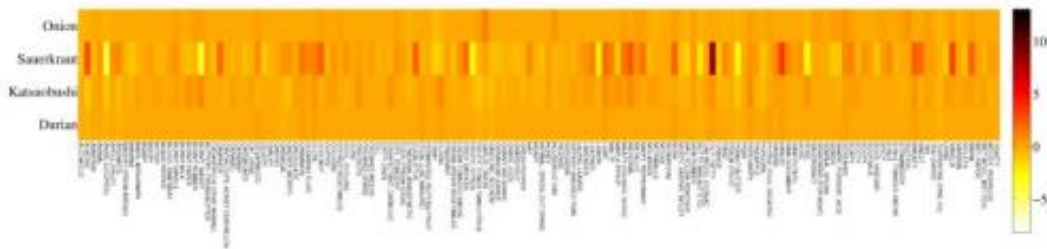


Brothers create mathematical model for creating odor cancelling smells

November 4 2014, by Bob Yirka



Perceptual representation of residual odor after cancellation of durian, katsuobushi, sauerkraut, and onion. Credit: Olfactory Signals and Systems arXiv:1410.4865 [cs.IT]

Brothers Lav Varshney with the University of Illinois, and Kush, with IBM's Thomas J. Watson Research Center have together come up with a way to create odor canceling smells, akin to white noise for sound. They've written a paper describing their work and have uploaded it to the preprint server *arXiv*.

Scientists long ago discovered that it was possible to "cancel" the perception of sound in humans by simultaneously playing a certain mixture of other sounds. They've also found a way to do roughly the same thing with light. Achieving that feat for smell proved more difficult—it wasn't until just two years ago that a team of researchers at Israel's Weizmann Institute of Science came up with a way to create

what they called "olfactory white." The idea is that for every odor, there is another odor that when smelled at the same time, results in the perception of no odor at all.

In this new effort, the research brothers took the idea further by creating a mathematical model that could be used to create a working olfactory white machine. To lay the groundwork for such a machine, the researchers studied a wide variety of odors and gave each a score (from -5 to 10) based on both its chemical and physical properties. Each of the odor scores was put into a database along with a paired canceling odor. A machine that took advantage of the database would first detect an odor, then emit a canceling odor. The machine could also conceivably understand new types of odors by mixing odors in its database and then coming up with a mix of canceling odors to render the new [odor](#) unsmellable.

The brother's Varshney have not created such a machine as yet, but are confident that the right mix of researches and engineers could build one, or many types of them. Some could be used to improve [indoor air quality](#), for example, in buildings, cars and other public or private places. It could also conceivably be used to make some foods that some people don't like, more palatable, as the sensation of taste is wound so tightly with smell. The key to such machines, would of course, be figuring out how to cause the existing bad smell to evenly mix with the canceling smell before both enter the nostrils.

More information: Olfactory Signals and Systems arXiv:1410.4865 [cs.IT] arxiv.org/abs/1410.4865

Abstract

Olfaction, the sense of smell, has received scant attention from a signal processing perspective in comparison to audition and vision. In this paper, we develop a signal processing paradigm for olfactory signals

based on new scientific discoveries including the psychophysics concept of olfactory white. We describe a framework for predicting the perception of odorant compounds from their physicochemical features and use the prediction as a foundation for several downstream processing tasks. We detail formulations for odor cancellation and food steganography, and provide real-world empirical examples for the two tasks. We also discuss adaptive filtering and other olfactory signal processing tasks at a high level.

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