

Researchers have taught an algorithm to 'taste'

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The flavor impressions were collected through a series of wine-tasting events. The wines were anonymized and each wine was labeled with a color and a number. Each participant was given a combination of wines to taste. Credit: Thoranna Bender

For non-connoisseurs, picking out a bottle of wine can be challenging when scanning an array of unfamiliar labels on the shop shelf. What does it taste like? What was the last one I bought that tasted so good?

Here, [wine](#) apps like Vivino, Hello Vino, Wine Searcher, and a host of

others can help. Apps like these let wine buyers scan bottle labels, get information about a particular wine, and read the reviews of others. These apps are built upon artificially intelligent algorithms.

Now, scientists from the Technical University of Denmark (DTU), the University of Copenhagen, and Caltech have shown that you can add a new parameter to the algorithms that make it easier to find a precise match for your own taste buds: Namely, people's impressions of flavor.

"We have demonstrated that, by feeding an algorithm with data consisting of people's flavor impressions, the algorithm can make more accurate predictions of what kind of wine we individually prefer," says Thoranna Bender, a graduate student at DTU who conducted the study under the auspices of the Pioneer Centre for AI at the University of Copenhagen.

More accurate predictions of people's favorite wines

The researchers held wine tastings during which 256 participants were asked to arrange shot-sized cups of different wines on a piece of A3 paper based on which wines they thought tasted most similarly. The greater the distance between the cups, the greater the difference in their flavor. The method is widely used in consumer tests. The researchers then digitized the points on the sheets of paper by photographing them.

The data collected from the wine tastings was then combined with hundreds of thousands of wine labels and user reviews provided to the researchers by Vivino, a global wine app and marketplace. Next, the researchers developed an algorithm based on the enormous data set.

"The dimension of flavor that we created in the model provides us with information about which wines are similar in taste and which are not. So, for example, I can stand with my favorite bottle of wine and say, I would

like to know which wine is most similar to it in taste—or both in taste and price," says Thoranna Bender.

Professor and co-author Serge Belongie from the Department of Computer Science, who heads the Pioneer Centre for AI at the University of Copenhagen, adds, "We can see that when the algorithm combines the data from wine labels and reviews with the data from the wine tastings, it makes more accurate predictions of people's wine preferences than when it only uses the traditional types of data in the form of images and text. So, teaching machines to use human sensory experiences results in better algorithms that benefit the user."

Can also be used for beer and coffee

According to Serge Belongie, there is a growing trend in machine learning of using so-called multimodal data, which usually consists of a combination of images, text, and sound. Using taste or other [sensory inputs](#) as data sources is entirely new. And it has great potential—e.g., in the food sector. Belongie states:

"Understanding taste is a key aspect of food science and essential for achieving healthy, sustainable food production. However, the use of AI in this context remains very much in its infancy. This project shows the power of using human-based inputs in [artificial intelligence](#), and I predict that the results will spur more research at the intersection of food science and AI."

Thoranna Bender points out that the researchers' method can easily be transferred to other types of food and drink as well. "We've chosen wine as a case, but the same method can just as well be applied to beer and coffee. For example, the approach can be used to recommend products and perhaps even food recipes to people. And if we can better understand the taste similarities in food, we can also use it in the health

care sector to put together meals that meet with the tastes and nutritional needs of patients. It might even be used to develop foods tailored to different [taste](#) profiles."

The researchers have published their data on an open server, which can be used for free.

"We hope that someone out there will want to build upon our data. I've already fielded requests from people who have additional data that they would like to include in our dataset. I think that's really cool," concludes Thoranna Bender.

The study is [published](#) on the *arXiv* preprint server.

More information: Thoranna Bender et al, Learning to Taste: A Multimodal Wine Dataset, *arXiv* (2023). [DOI: 10.48550/arxiv.2308.16900](#)

Provided by University of Copenhagen

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