Nakamoto LAB

beside the smell

Tokyo Institute of Technology

Odor Reproduction

An odor reproduction is a method to blend odor components to approximate target odor. Approximated odor should be as close to the target odor as possible.

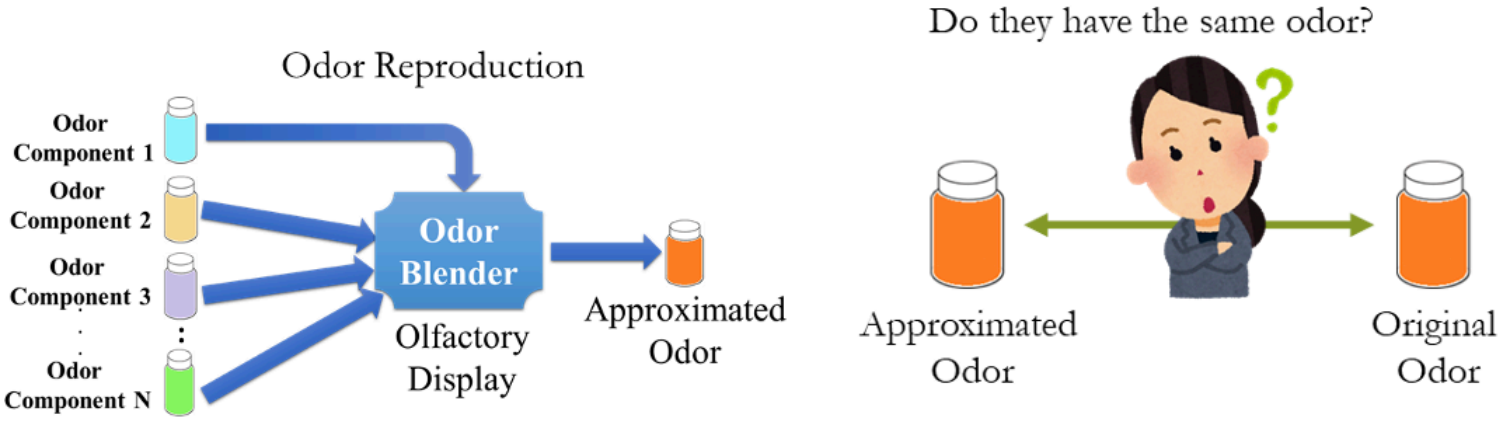

Figure 1. Illustration of odor reproduction.

Odor reproduction can be done by:

1. Extracting mass spectrometry of odor samples.
2. Analyze odor reproduction using NMF and nonnegative least squares method. We compared the performance of two different divergences (Itakura-Saito divergence and Kullback-Leibler divergence) in approximating odor.
3. Approximate target odor and compared with original one using sensory test (duo trio test). We approximate odor using 10 odor components.

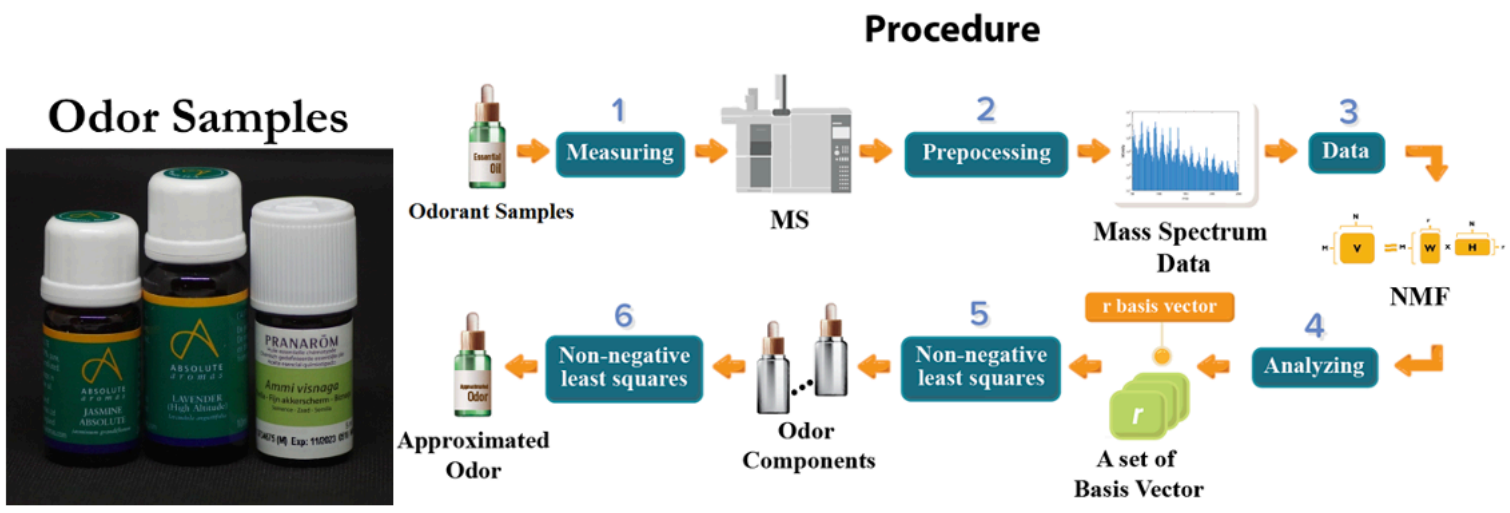

Figure 2. Odor samples and procedure of odor reproduction.

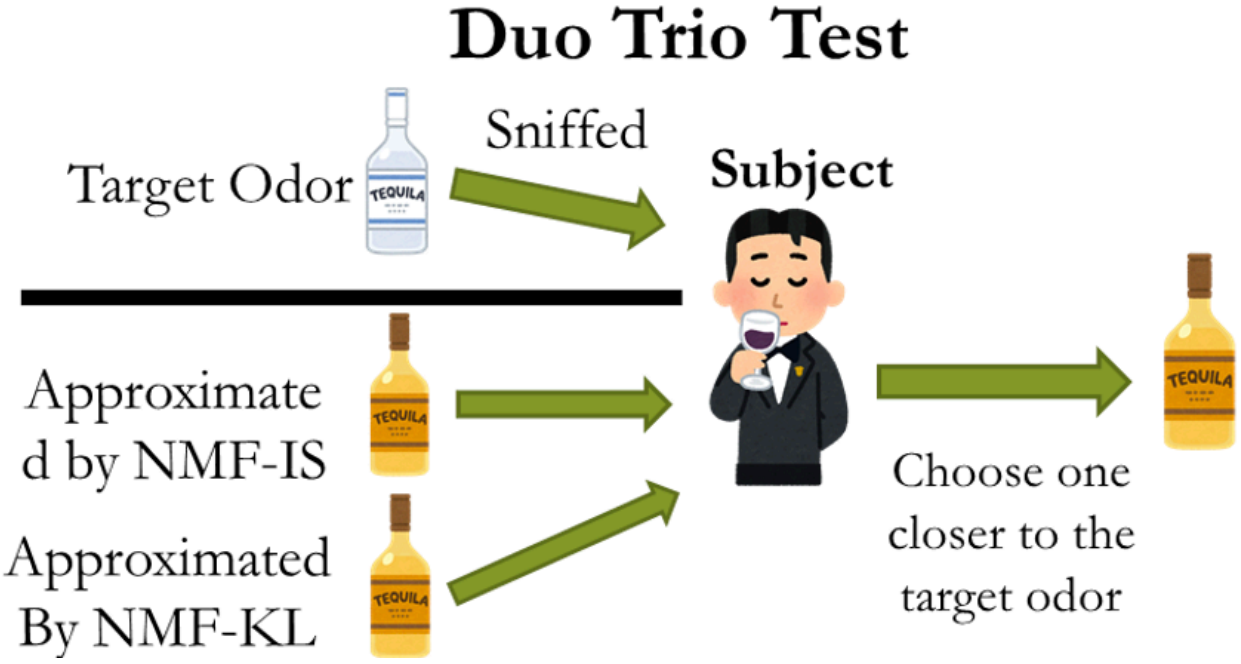

Figure 3. Illustration of duo trio test.

PAGE TOP

Table 1. Result of duo trio sensory test.

Result of Duo Trio Test

$$Z = \frac{P_{observed}\ P_{expected} - (0.5/N)}{\sqrt{0.5/N}}$$

	Number of Subcjects	Number of Subjects to Choose NMF-IS	Number of Subjects to Choose NMF-KL	Z Score
Orange	24	19	5	2.654
Mentha	24	20	4	3.062
Origanum	24	12	12	-0.204
Ylang-ylang	24	18	6	2.245
Clove	24	11	13	-0.612
Cypress	24	7	17	-2.245
Total	**144**	**87**	**57**	**2.417**

24 human subjects aged 22-51 were participated.

The results show that NMF together with IS divergence as a cost function improved the approximation accuracy.

PAGE TOP