

## Search of the odor components of car-cabin odors

### First

Nowadays, there are some aroma items, and many people recognize the value of odor. However, how you select chemicals in order to make up the odor you want is unclear, and has been dependent on human's experience and noses.

In our previous study, we made up odors of food and oils by using mass spectrometry, not by human's nose. Then, here, we applied those technics to car-cabin odors and searched the odor components of them by computation.

### Experiment

We approximate odors by using odor components. Fig.1 shows the odor components' role. Odor components make the making-up easier. If the number of odor components is enough small, then we can use our olfactory display. We compute odor components by NMF (Nonnegative Matrix Factorization; explained by another page) method shown in fig.1.

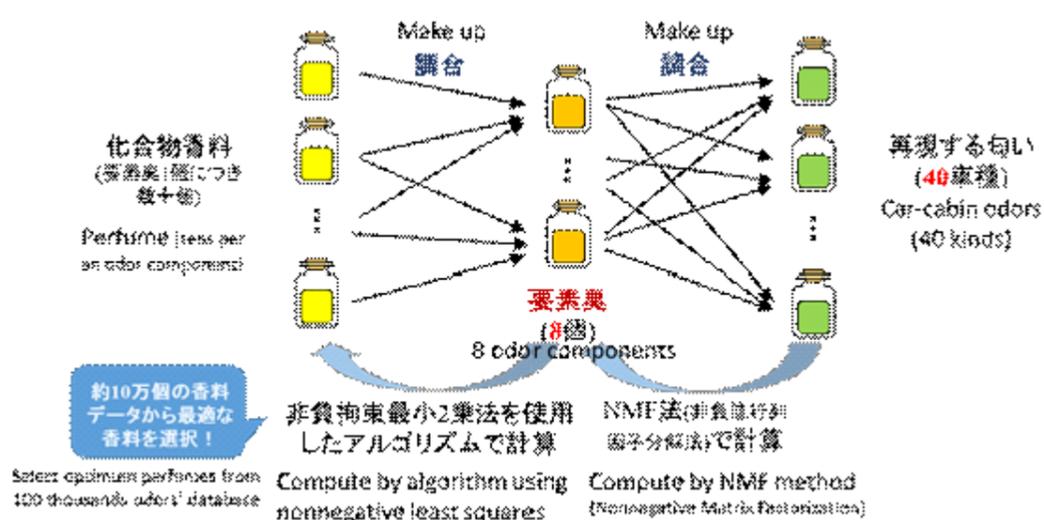


Fig.1

We experimented with NMF method to determine the number of the odor components. Fig.2 show the residual of approximated odors for each number of odor components. The result is one of local optimums because parameters' initial values effect on its result. Therefore, we applied NMF method for 500 sets of initial values for each number of odor components. Fig.2 includes all results of those. We use Itakura-Saito divergence as the criterion of NMF method which leads a better precision for odors' data.

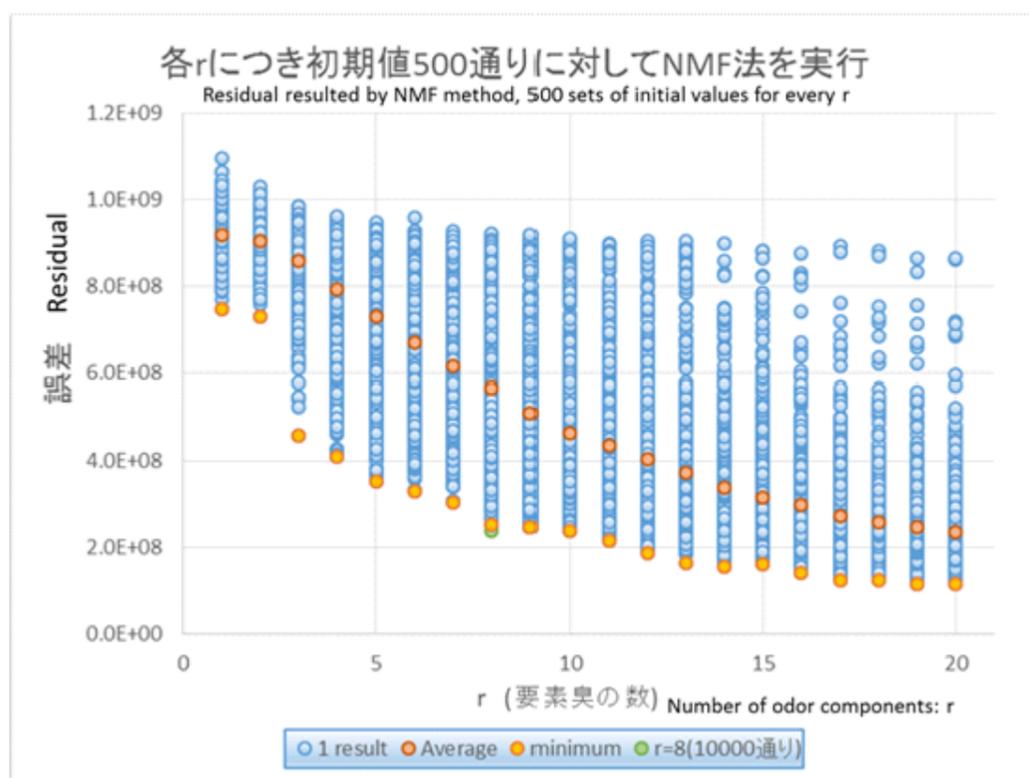


Fig.2

From Fig.2, we determined the number of odor components as 8. Then, we increased the sets of initial values from 500 to 10000 because 500 sets can't be enough. The least residual for 10000 results is shown as a green point in Fig.2. Then, the basic matrix computed by NMF method when we got the green point is the spectrometry of odor components. Fig.3 shows a color map of the approximated matrix and of the original.

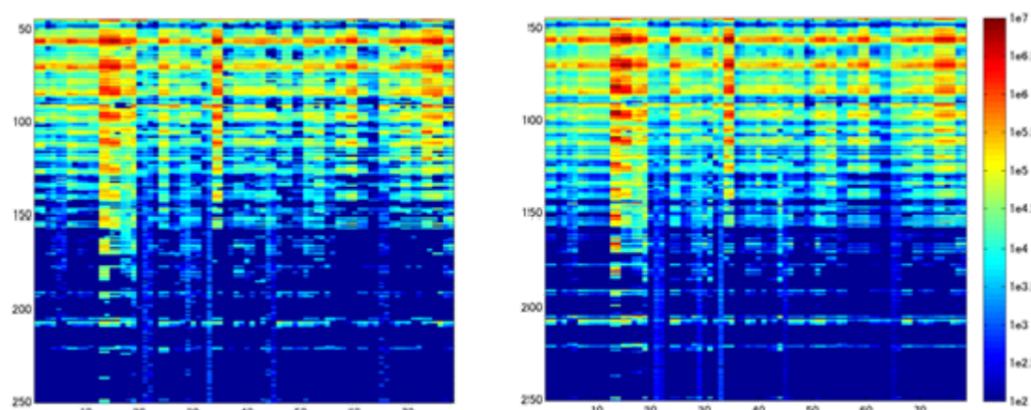


Fig.3

Left:Original matrix of car-cabin odors, right: Approximated matrix

## Summary

We computed the odor components of 40 kinds of car-cabin odors and determined the number of those as 8. We confirmed the approximated spectrometry will represent the car-cabin odors enough. Next step is to approximate odor components by real perfumes.

## 参考文献

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