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Suitability of using network maps to explore multiple hoppy sensory dimensions



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BACKGROUND & AIM

Multidisciplinary research can lead to the exploration and potential application of analytical tools originally used in one research field to a different one.

The use of **network maps** in sensory science has been explored, but its use within **text data analysis** remains rare and limited. Its usability applied to online text data was tested in the current study. **Our goal was to investigate the potential different sensory dimensions and associations linked to the perceived ‘hoppy-ness’ in beers.**

Timing and proportion of bittering and aromatic hops added during brewing is different based on the type of beer. Nevertheless, the use of aromatic hops, which contribute to the ‘hoppy’ character, is larger in specific styles of ale beers.

DATA STRATEGY

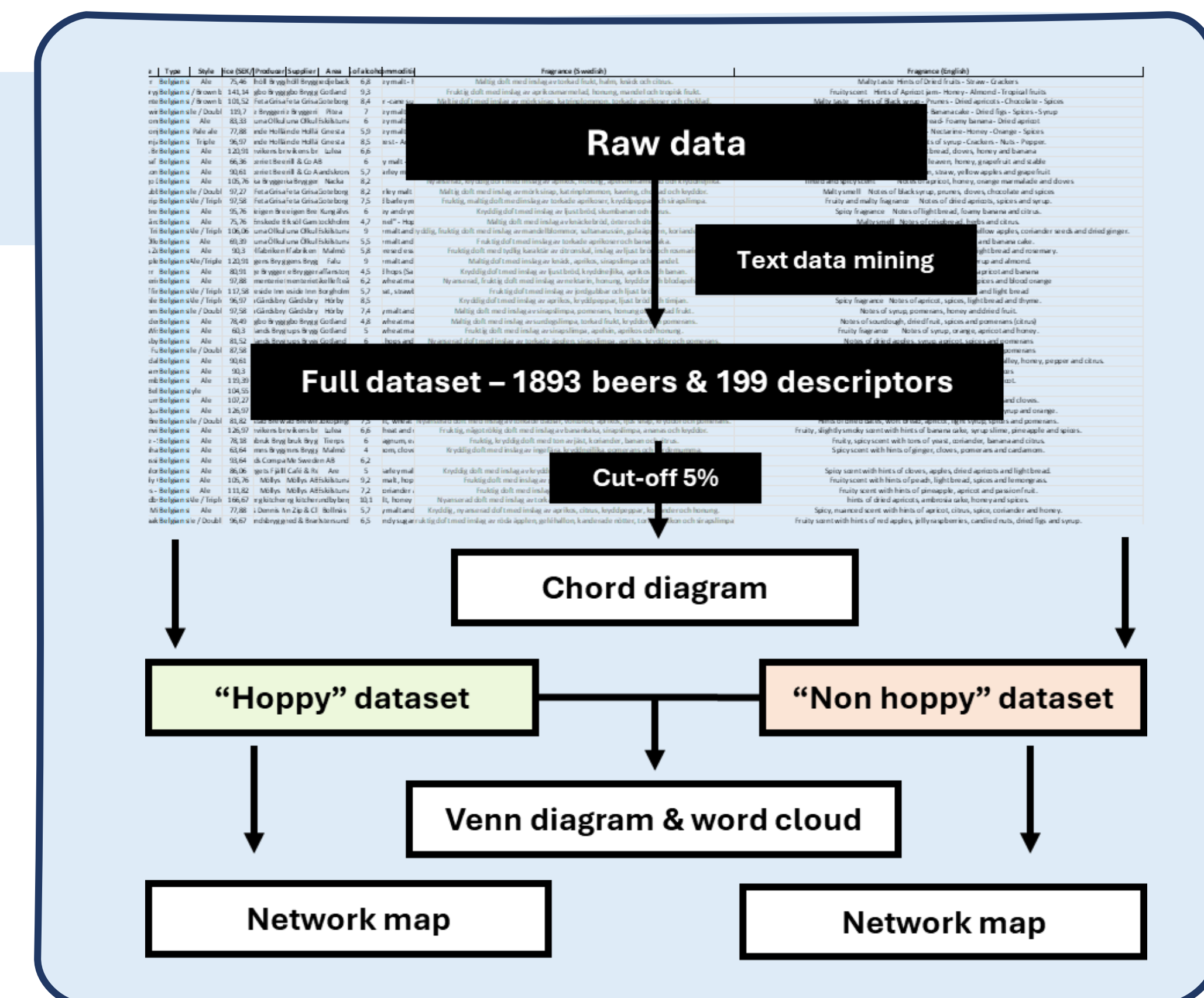
Sensory description of a total of 1974 beers was extracted from Systembolaget website (Swedish National alcohol retail monopoly). Dataset was cleaned, duplicates excluded (resulting in 1893 beers), then split into Ale British-American style and all the other beer styles and labeled as “hoppy” and “non_hoppy” respectively.

A 5% frequency of citation cut-off was applied for further data analysis.

1. **Chord plots** illustrate the cooccurrence of different sensory descriptors on full dataset.

2. **Venn diagram** shows overlapping and non-overlapping terms between “hoppy” and “non_hoppy” datasets. Terms are displayed as a Wordcloud based on their frequency of citation.

3. **Network maps** display associations between sensory descriptors and were coloured according to different cluster formations. The thickness of the links between nodes represents the level of cooccurrence.



RESULTS

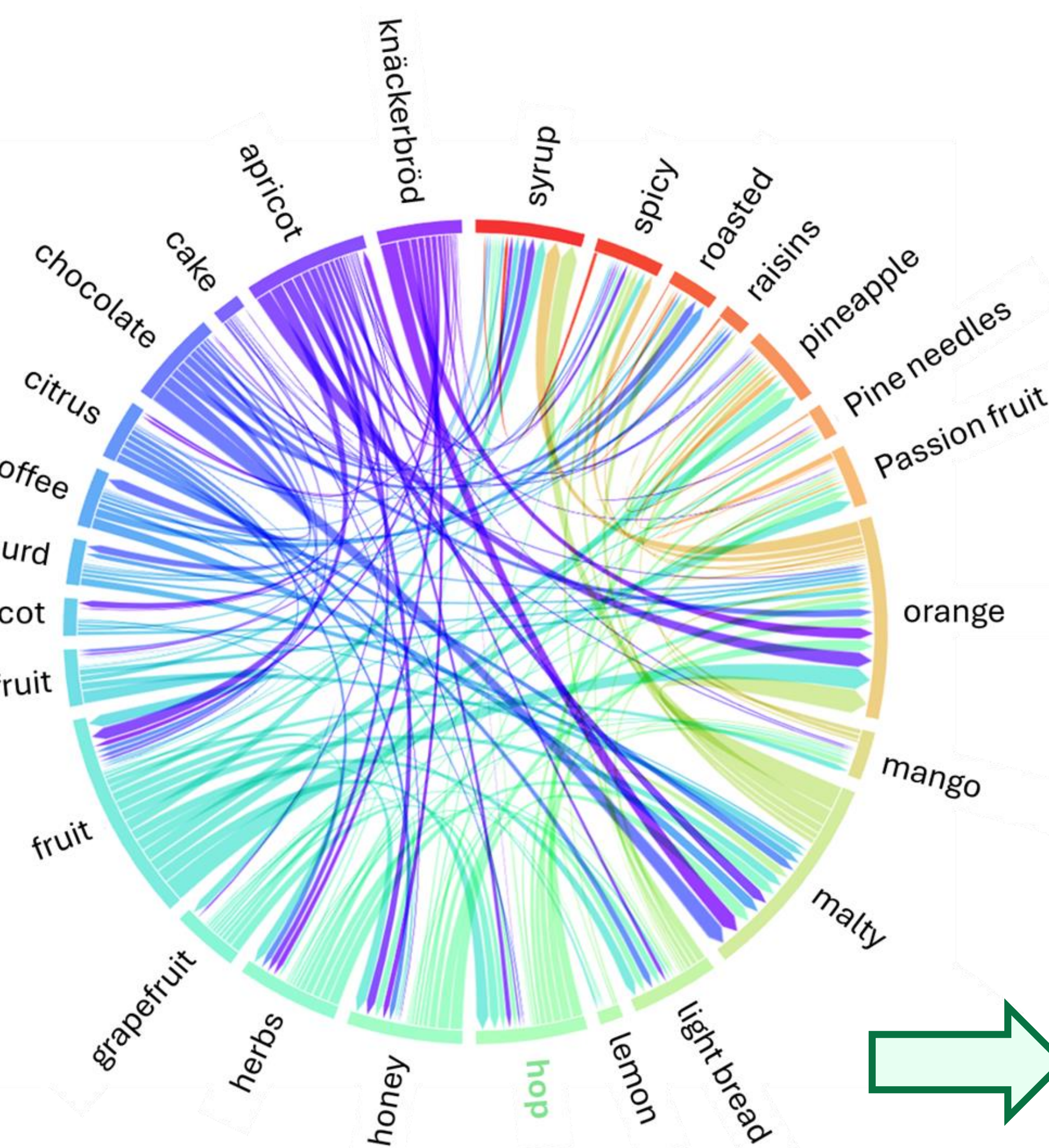


Figure 1. Chord diagram illustrating the cooccurrence of the different sensory attributes for the full dataset.

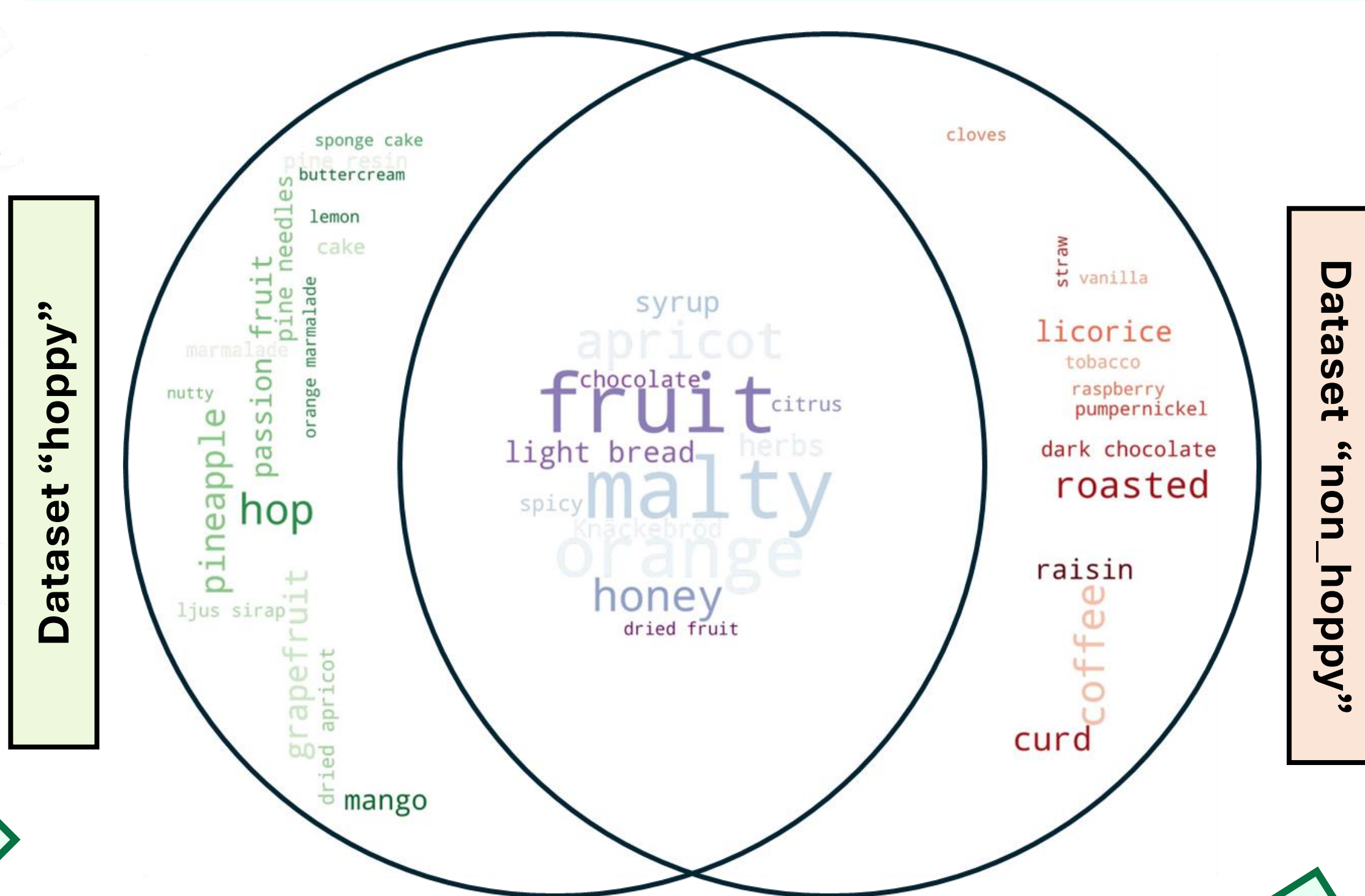


Figure 2. Venn diagram illustrating common and non-overlapping terms between “hoppy” and “non_hoppy” datasets after clean-up.

➤ The term “hop” cooccurs with multiple sensory descriptors (**Figure 1**).

➤ **Non-overlapping terms (Figure 2)**
On the left side, 16 descriptors only associated to beers in the “hoppy” dataset.

On the right side, 12 terms were only associated to beers in “non_hoppy” dataset.

➤ In the centre, 13 **overlapping terms (Figure 2)**. “Malty” and “fruit” were predominant.

➤ Network maps in **Figure 3** show the sensory descriptors associations.

➤ **For the “hoppy” dataset (Figure 3 A): 3 clusters**

The term **“hop”** is found in the **yellow cluster**.

Its highest cooccurrences are with “fruit” (190 times), followed by “pineapple” (163).

Terms “orange” and “apricot” (**blue cluster**) show a stronger link with “fruit” (221 and 138 cooccurrences) than with “hop” (148 and 90).

➤ **For the “not_hoppy” dataset (Figure 3 B): 2 clusters**

In **purple**, overlapping sensory attributes such as “malty”, “orange” and “fruit”. In **pink**, non-overlapping sensory attributes such as “chocolate”, “coffee” and “roasted”.

CONCLUSION

➤ Network maps are suitable to explore term-to-term association and sensory spaces.

➤ The space distribution gives a better overall representation than chord plots.

➤ Node sizes and link width highlight the relevance of attribute relationships.

➤ A total of 29 overlapping (13) and non-overlapping (16) terms were associated with “hoppy” dataset.

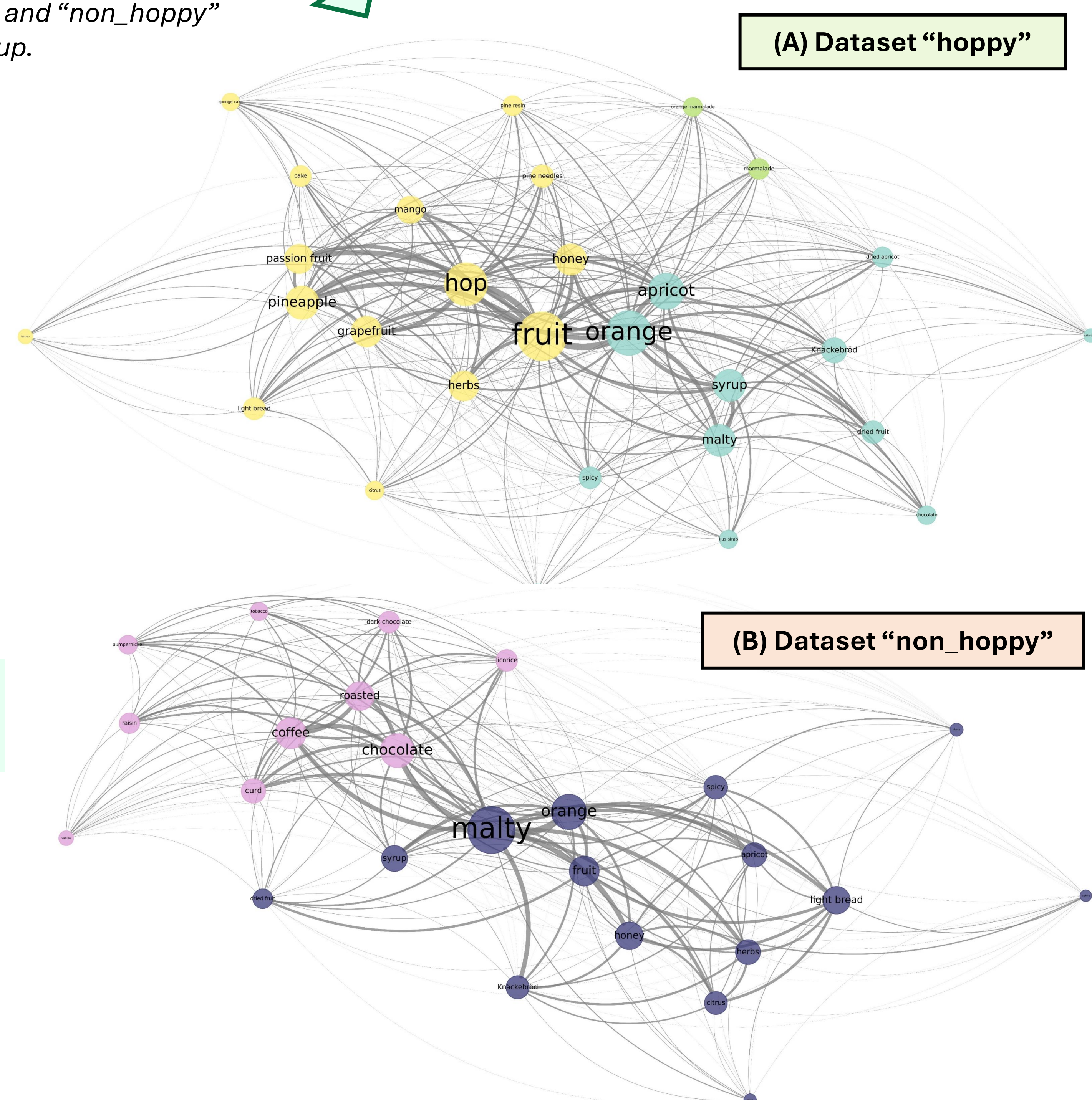


Figure 3. Network maps of “hoppy” (A) and “not_hoppy” (B) datasets illustrating the different term-to-term associations.