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Analyze and recreate the “Flavor network and the principles of food pairing” study

Introduction

PURPOSE

METHODOLOGY

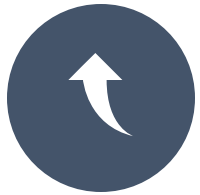
RESULTS

Methodology

FLAVOR COMPOUNDS IN INGREDIENTS

EXTRACTING THE BACKBONE

FOOD PAIRING



DIFFERENCE IN CUISINES

THE FLAVOR PRINCIPLE

SHARED INGREDIENTS

Results

The dataset

Ingredient1, Ingredient2, shared_compounds
black_sesame_seed,rose_wine,3
fennel,wild_berry,5
comte_cheese,grape,57
nira,raw_beef,1
corn_mint_oil,parsnip_fruit,2

Region, ingredient1, ingredient2, ….
African,chicken,cinnamon,soy_sauce,onion,ginger
African,butter,pepper,onion,cardamom,cayenne,ginger,cottage_cheese,garlic,brassica
African,olive_oil,pepper,wheat,beef,onion,cardamom,cumin,garlic,rice,leek
African,honey,wheat,yeast

Results

What we used

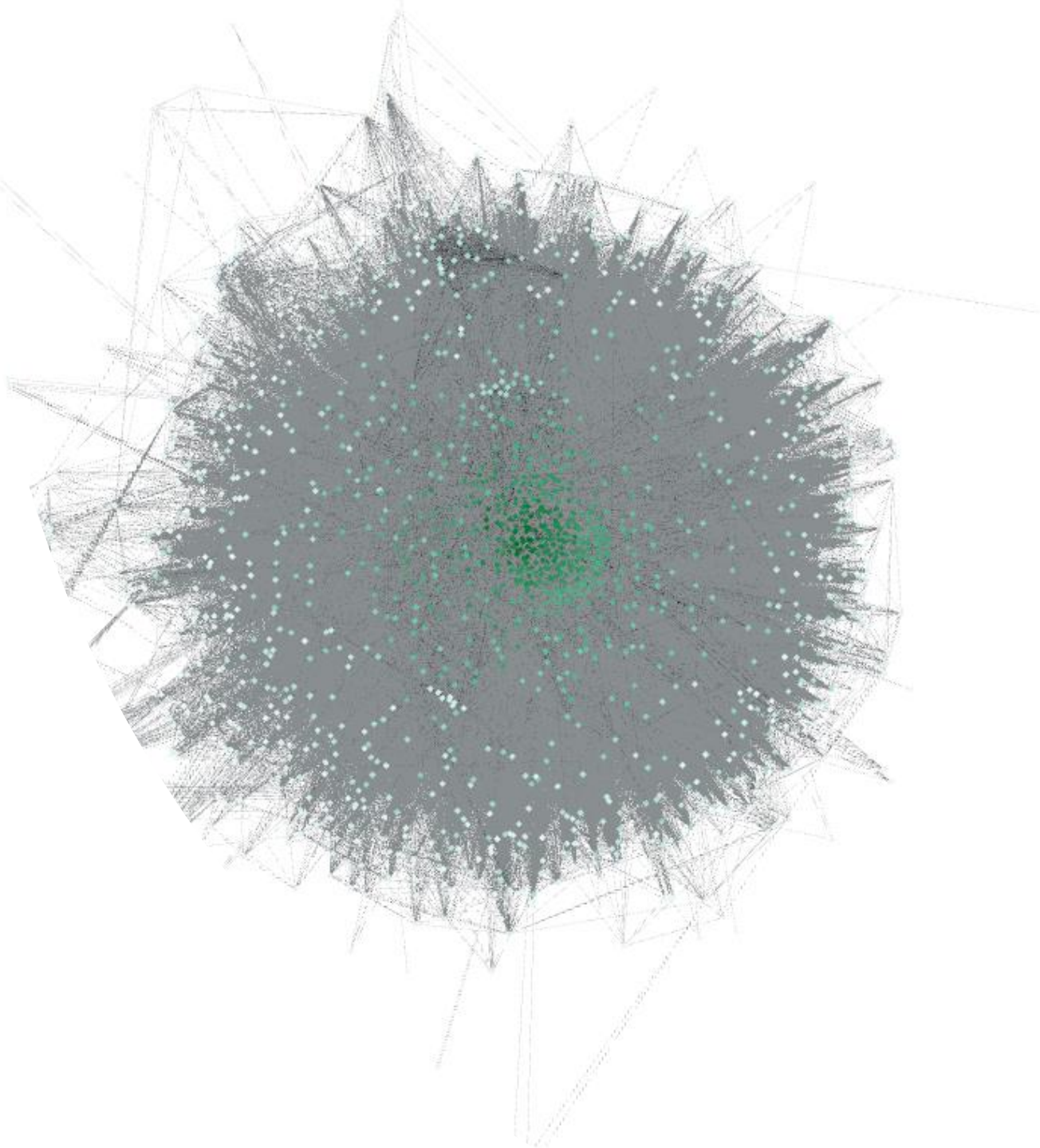
- **Python, NetworkX** – parsing the data, creating new datasets
- **Gephi** – visualization (graphs)
- **Exel** – visualization (charts)

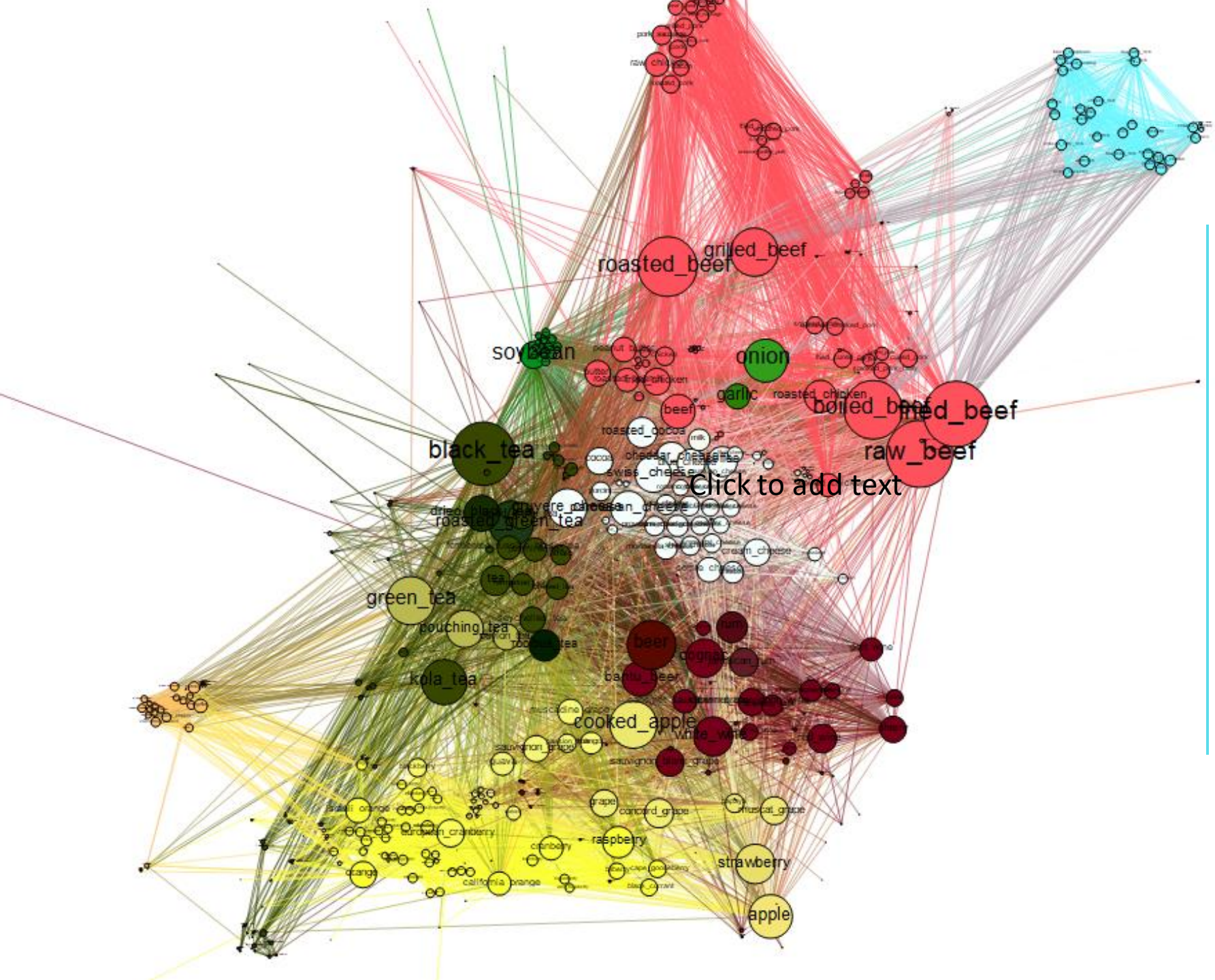
Flavor compounds network and extracting the backbone

Results

Flavor compounds weighted network

- Too many links
- Hard to visualize
- Can't see important connections
- Can't see food groups





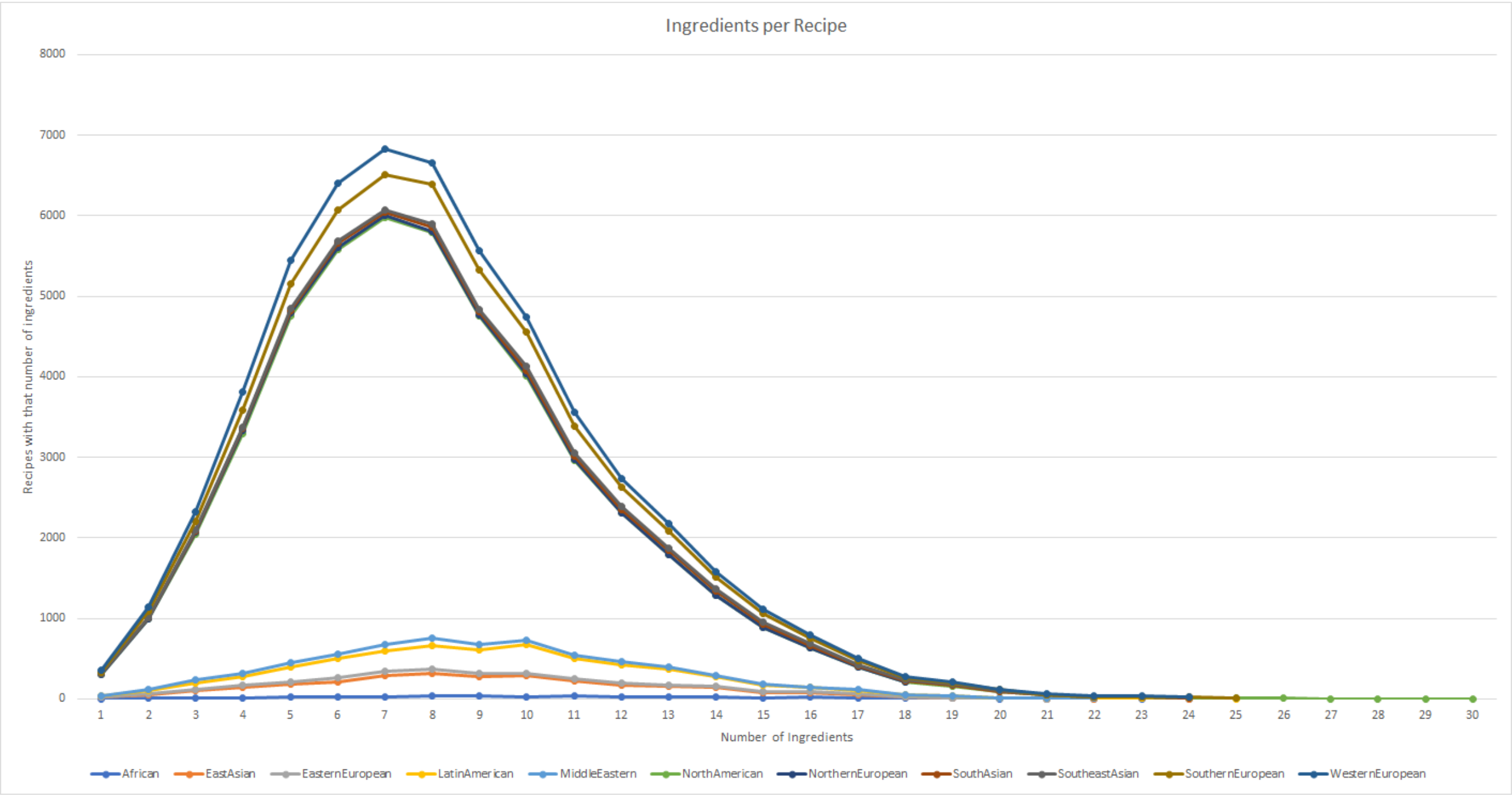
Extracted backbone

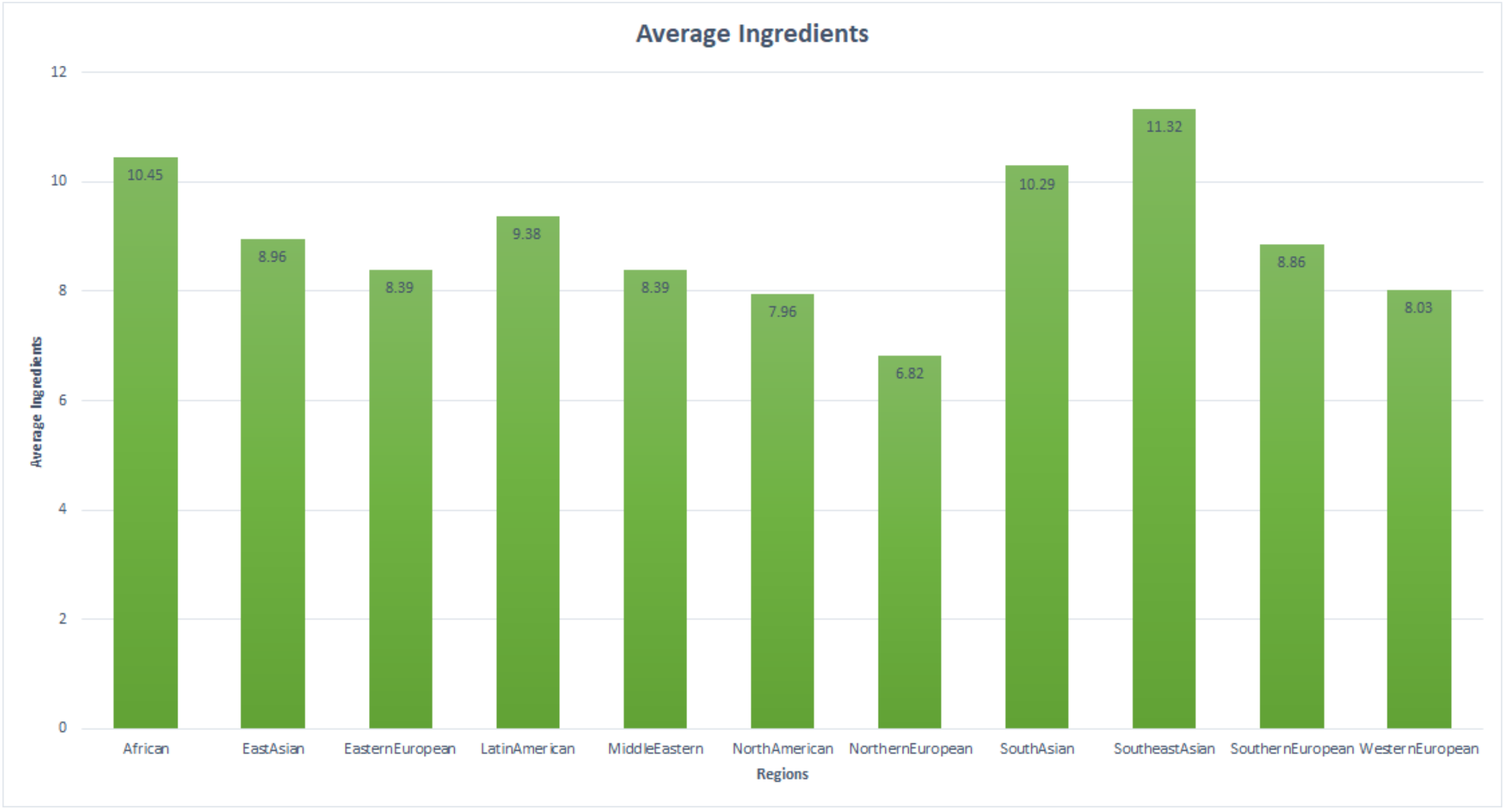
- Food groups
- Main ingredients

Results

Food pairing

- Overall ingredients per cuisine
- Average ingredients per cuisine

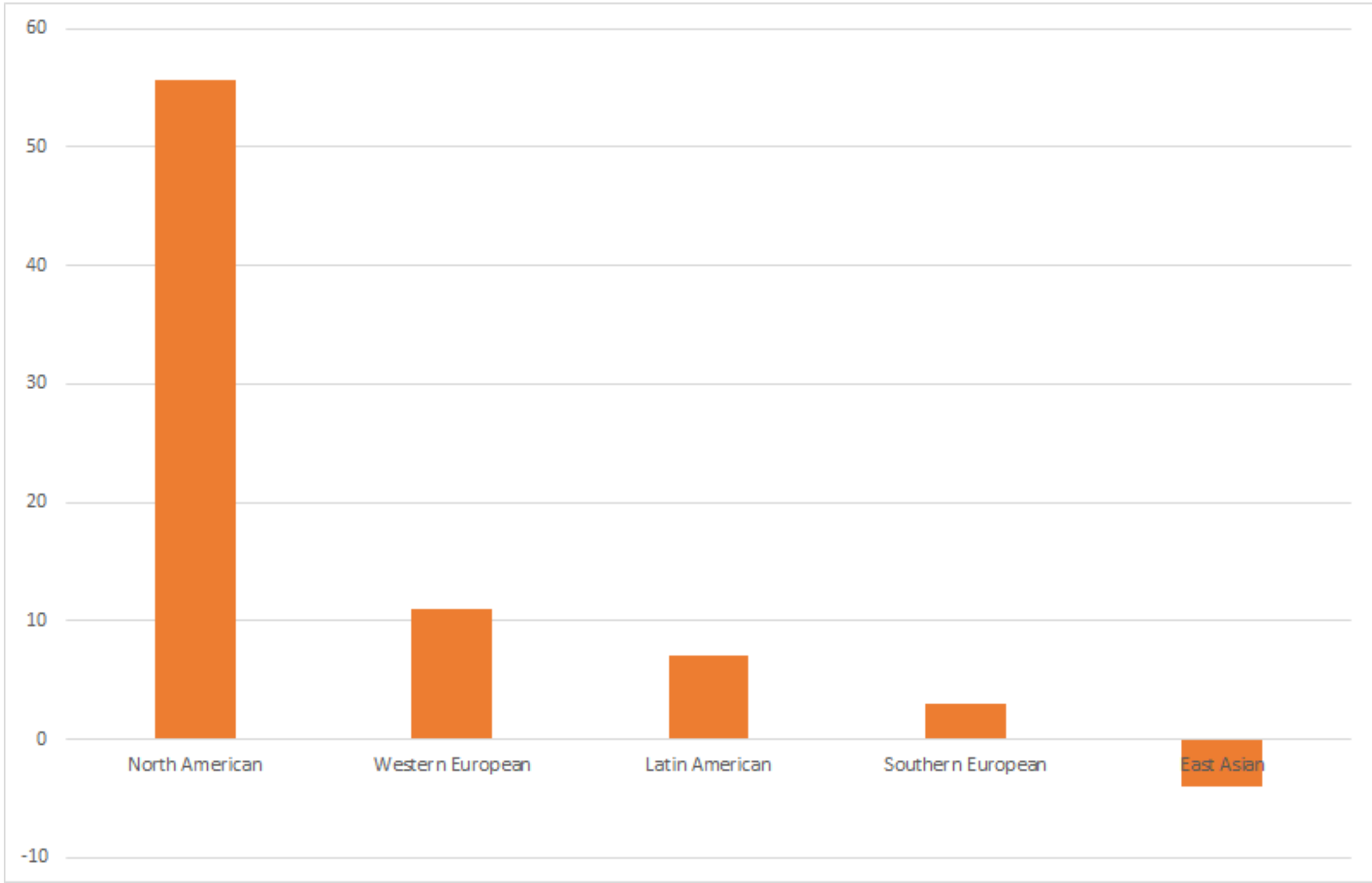

Ingredients per Recipe
Recipes with that number of ingredients
8000
7000
6000
5000
4000
3000
2000
1000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Number of Ingredients
African
EastAsian
EasternEuropean
LatinAmerican
MiddleEastern
NorthAmerican
NorthernEuropean
SouthAsian
SoutheastAsian
SouthernEuropean
WesternEuropean


Average Ingredients
12
10
8
6
4
2
0
Average Ingredients
10.45
8.96
8.39
9.38
8.39
7.96
6.82
10.29
11.32
8.86
8.03
African
EastAsian
EasternEuropean
LatinAmerican
MiddleEastern
NorthAmerican
NorthernEuropean
SouthAsian
SoutheastAsian
SouthernEuropean
WesternEuropean
Regions

Results

Shared compounds

- Dividing by region
- Does every region like ingredient combinations what share a lot of compounds?


60
50
40
30
20
10
0
-10
North American
Western European
Latin American
Southern European
East Asian

Results

Authentic ingredients

- What are authentic ingredients?
- Will they support the the previous results?

Results

Authentic ingredients

North American authentic ingredients

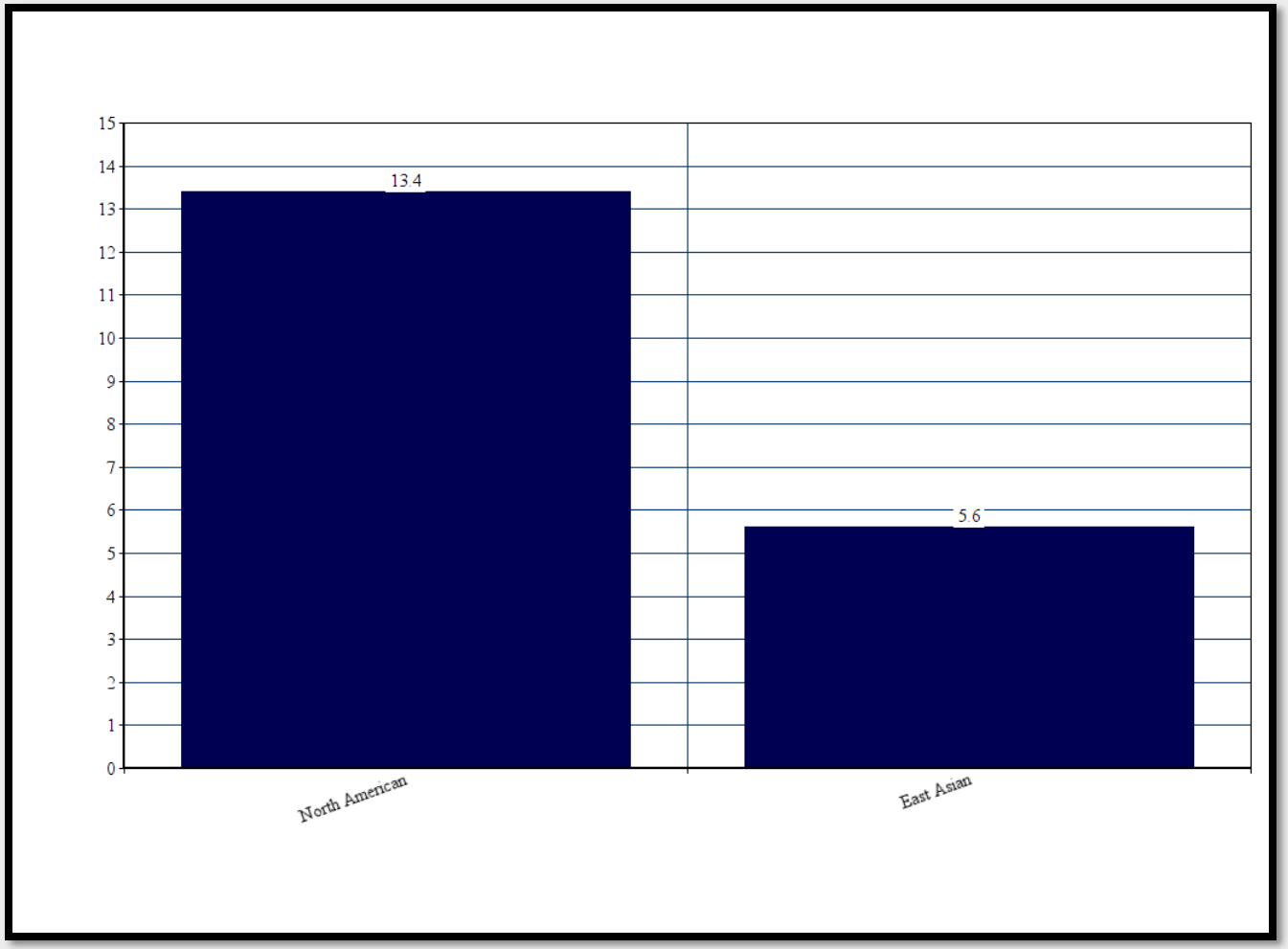
Ingredient	Prevalence
milk	0.529
butter	0.511
cocoa	0.377
vanilla	0.239
cream	0.154
cream_cheese	0.154

East Asian authentic ingredients

Ingredient	Prevalence
rice	0.294
red_bean	0.152
milk	0.055
green_tea	0.041
butter	0.041
peanut	0.038

North American cuisine is more likely to use ingredients that share a lot of compounds

East Asian cuisine is more likely to use ingredients that don't share a lot of compounds



Conclusion

Recreation

Confirmation of study

Improvement

References

- Flavor network and the principles of food pairing
  Yong-Yeol Ahn, Sebastian E. Ahnert, James P. Bagrow & Albert-László Barabási
  https://www.nature.com/articles/srep00196
- Network
  https://networkx.github.io/
- numpy
  http://www.numpy.org/
- Github repository with the project code for parsing the data
  https://github.com/BonneC/flavor-RM