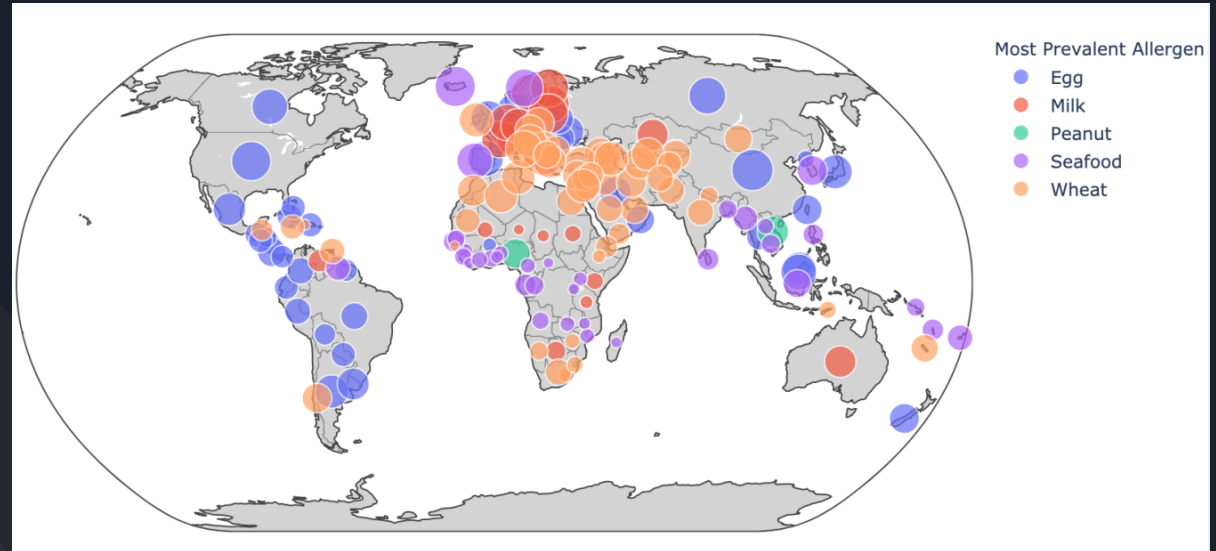


AllerVis

Geospatial Visualization of National Per Capita Consumption of Primary Food Allergens



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From *Country v. Country* to AllerVis

- *Country v. Country* was a tool designed to compare two given countries on a set of pre given indices.

E.g. What are the five major export products of Namibia and Bangladesh?

- Aimed to provide a more holistic representation of countries.



From *Country v. Country* to AllerVis

- Limitations:
 - Binary
 - Large scope
 - Not user driven
- Solution:
 - Task driven tool
 - Limited scope
 - Everyday relevancy

E.g. Expatisan

Cost of living in Johannesburg, South Africa vs Vancouver, Canada

How much money will you need in Johannesburg?
Find out with your own Salary Calculation.

Food	- 49%
Housing	- 51%
Clothes	- 1%
Transportation	- 17%
Personal Care	- 54%
Entertainment	- 45%
TOTAL	- 40%

Cost of living in Johannesburg (South Africa) is 40% cheaper than in Vancouver (Canada)

Are you moving to Johannesburg? Do you know how much money you will need there to maintain your current standard of living?

Find out what is the real equivalent in



Motivation: Rhys goes to Thailand

RHYS' ALLERGIES

1. Eggs
2. Peanuts
3. Tree Nuts
 - a. Almonds,
 - b. Walnuts
 - c. Pine nut
 - d. Macadamia nut
 - e. Cashews
 - f. Pistachios

MOST COMMON DISHES IN THAILAND

1. Thai Fried Rice: **EGGS, SHELLFISH, SOY, FISH**
2. Tom Kha Gai: **FISH**
3. Green Chicken Curry: **SESAME, SOY, FISH.**
MAY CONTAIN: PEANUTS
4. Pad Thai: **PEANUTS, EGGS, SHELLFISH, SOY AND FISH**
5. Tom Yum Goong: **SHELLFISH AND FISH**



Who is the user?

- I AM
- MY SON IS ALLERGIC TO [X] AND [Y], **GIVEN A CHOICE**, WHERE SHOULD WE GO?
- MY WIFE IS

Responds to:

- A significant part of the population that is affected by food allergies.
- An increase in international travel for leisure.
- Globalized food consumption habits.
- 90% of all food allergies are caused by only eight allergens: soy, egg, fish, milk, shellfish, peanuts, tree nuts and wheat.



Similar resources:

- No tool available for this specific task or user.
- Food blogs:
 - ALLERGIC LIVING
 - TORTUGA
 - FOOD ALLERGY CANADA
- Resources with barriers to entry
E.g. allergyinside.com

Travel

It's true – you can enjoy a lifetime of travel, even with food allergies! By planning ahead and taking precautions, you can be allergy aware and stay safe while travelling.

<https://foodallergycanada.ca/living-with-allergies/ongoing-allergy-management/managing-in-different-environments/travel/>

Related Vis Work: Zhihua et al. (2019)

Geospatial Visualisation of Food Contaminant Distributions

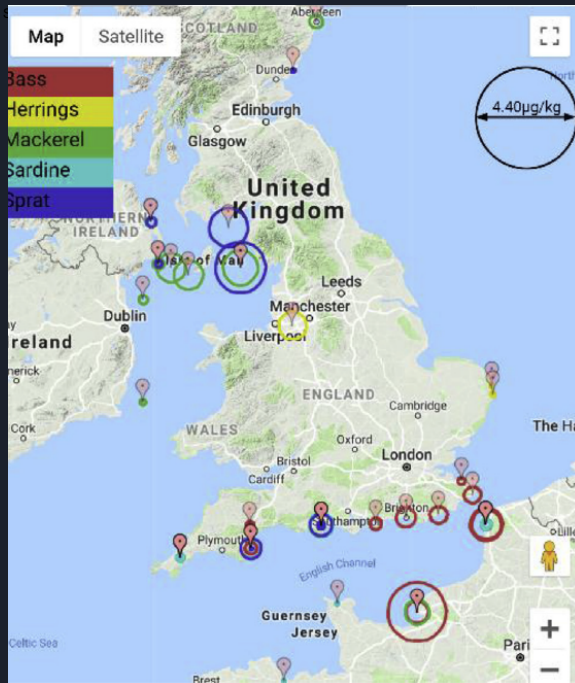


Figure 1: Spatial distribution of sum PCN congeners for locations around the UK

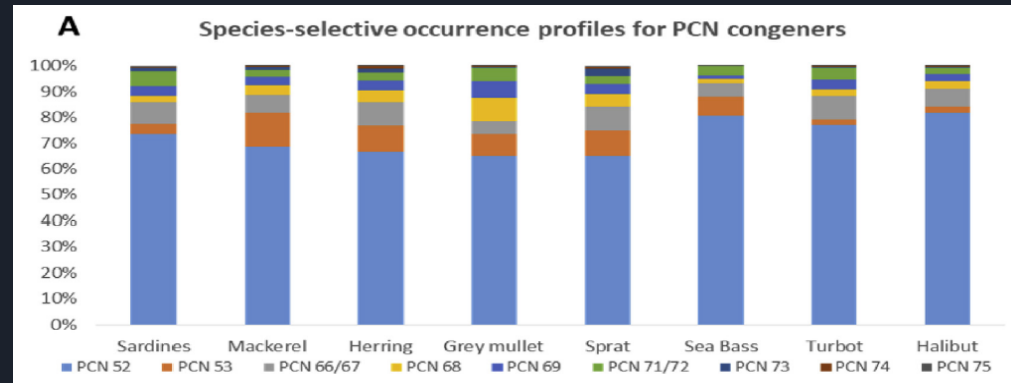


Fig 2: PCN congener occurrence

Related Vis Work: Malicka (2020)

CONSUMPTION OF FOOD IN THE EU BY THE DEGREE OF URBANIZATION

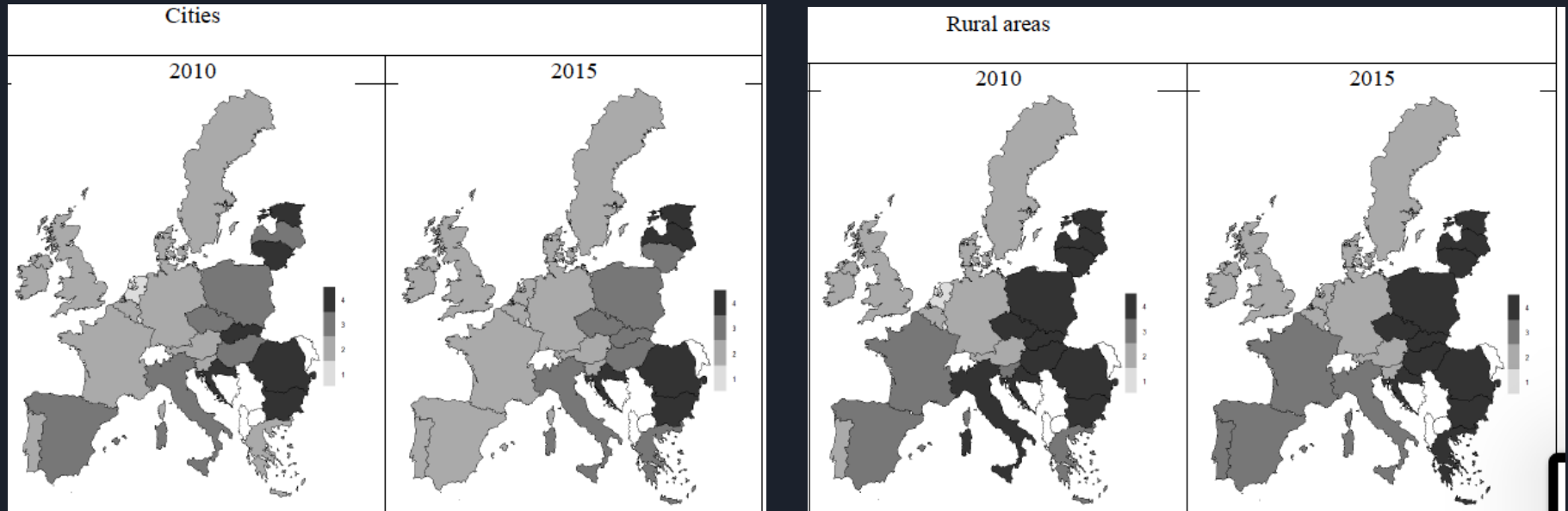


Figure 1: A comparison: Intensity of food consumption by the degree of urbanization in 2010 and 2015



19 allergens in total

Nuts	Cereals	Animal-based
1. Almond	10. Barley	16. Beef
2. Hazelnut	11. Corn	17. Seafood
3. Macadamia	12. Oat	18. Egg
4. Cashew	13. Rye	19. Milk
5. Peanut	14. Rice	
6. Pecan	15. Wheat	
7. Pine Nut		
8. Pistachio		
9. Walnut		



How did we find the data?

- Use consumption as a proxy for popularity
- All consumption data is **kilograms per capita**
 - Quantitative value
 - Range varies with specific allergen



How did we find the data?

- Assembled our own dataset from multiple sources
- Main data source: UN Food and Agriculture Organization (FAO)
 - Usage was “indirect”
- Other data sources: Our World in Data, International Nut & Dried

Fruit



Main derived attribute: Prevalence score

- A score from 0 to 1 was given per allergen, per country
 - Function of that country's consumption relative to the maximum consumption:
 - $\text{country_consumption} / \text{max_consumption}$



Prevalence score with multiple allergens

- Each allergen's score is calculated individually
- Scores are aggregated by summation
- Thus, range is $[0, N]$ for N allergens



Other derived data: Most/Least prevalent

- Finds most/least prevalent allergen for each country given choices of allergens
- Use highest/lowest individual prevalence score
- Result is a categorical attribute for the most/least prevalent



Solution and Implementation

- Heroku app: Heroku app: allervis.herokuapp.com
- Implementation completely in Python
 - Including HTML and CSS
- Pandas and Numpy for data wrangling
- Plotly + Dash for plotting



Demo



LIMITATIONS AND FURTHER WORK:

- Data:
 - Insufficient data for some allergens.
 - Missing data for allergens that are not consumed directly.
 - Consumption data is not equivalent to allergy prevalence.
 - National category erases diversity within nation.



LIMITATIONS AND FURTHER WORK:

- Solution:
 - Significant lag
 - Map and bar chart are not interactive.
 - Too many allergens too many colors.
 - Mercator projection advantages northern and larger countries.
 - Cartogram not explored.



Thank you!