National parks example

1. The map was created in ArcGIS Pro. The data were visualized, but no transformative operations were conducted.
2. The graph was generated manually in the yEd .graphml editor.

Calculation of Wu-Palmer similarities in section 4.1

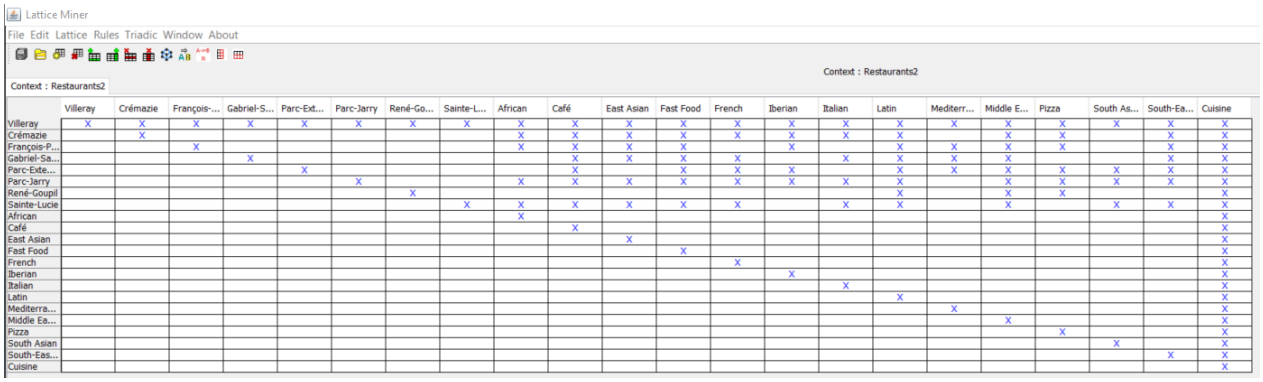
1. A Formal Concept Analysis Incidence table was generated manually following the principles in section 4.1. The table can be found in file "Restaurants_fca.csv".
2. Running the main1 function in "main.py" script in Python generates the following:
    - "rest_fca1.graphml" contains a concept lattice. *To get node labels, select edit -> Properties mapper. Map "objects" to the labels and "attributes" to the tooltip.*
    - "rest_fca2.graphml" gives an overview of the concepts in the concept lattice
    - "rest_wupalmer_results1.csv" contains node depths for pairs of nodes and their least common subsumers and their wu-palmer score for the **extensional** similarities.
    - "rest_wupalmer_crosstable1.csv" displays the wu-palmer scores in a cross-table for the **extensional** similarities
    - "rest_wupalmer_results2.csv" contains node heights for pairs of nodes and their least common subsumers and their wu-palmer score for the **intensional** similarities.
    - "rest_wupalmer_crosstable2.csv" displays the wu-palmer scores in a cross-table for the **intensional** similarities
3. The extensional and intensional similarities are joined in a file "both_crosstable.csv" manually.
4. The figure in section 4.1 can be generated by running the main2 function, which generates a file "both_sim.png"

Required non-native packages are matplotlib.pyplot, pandas, and numpy. The "data_outputs" folder contains pre-generated versions of the output files.

Alternative approach to generating the concept lattice in the restaurants example

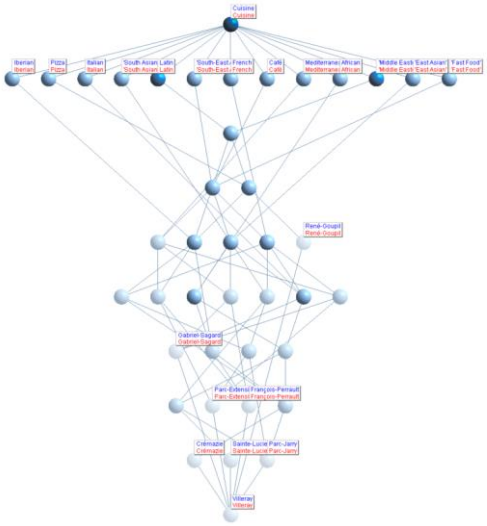
To help understand the principles behind the code, we offer an alternative (but more laborious) approach. This approach makes use of the *lattice miner 2.0* software, which can be downloaded for free from https://github.com/LarimUQO/lattice-miner/releases/tag/v2.0.0:

1. An incidence table was manually created in Excel ("Restaurants_FCA.xlsx")
2. The Excel table was manually converted to a format readable by Lattice Miner 2.0 ("Restaurants_FCA.slf").
3. Open the table in Lattice Miner 2.0 by going to *File -> Open* and selecting "Restaurants_FCA.slf". The result should look as follows:



	Villeray	Crémazie	François-...	Gabriel-S...	Parc-Ext...	Parc-Jarry	René-Go...	Sainte-L...	African	Café	East Asian	Fast Food	French	Iberian	Italian	Latin	Mediterr...	Middle E...	Pizza	South As...	South-Ea...	Cuisine
Villeray	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Crémazie		X							X	X	X	X	X	X	X	X		X	X		X	X
François-P...			X						X	X	X	X		X		X	X	X	X		X	X
Gabriel-Sa...				X						X	X	X	X		X	X	X	X			X	X
Parc-Exte...					X					X		X	X	X		X	X	X	X	X	X	X
Parc-Jarry						X			X	X	X	X	X	X	X	X		X	X	X	X	X
René-Goupil							X									X		X	X			X
Sainte-Lucie								X	X	X	X	X	X		X	X		X		X	X	X
African									X													X
Café										X												X
East Asian											X											X
Fast Food												X										X
French													X									X
Iberian														X								X
Italian															X							X
Latin																X						X
Mediterra...																	X					X
Middle Ea...																		X				X
Pizza																			X			X
South Asian																				X		X
South-Eas...																					X	X
Cuisine																						X

4. A lattice can be generated by pressing  in the ribbon. The result should look similar to the following:



5. Conceptually, node depths and heights can be added by starting at the root node, which are respectively the top and the bottom nodes, and incrementing a score by 1 per step with a starting value of 1. These scores can then be used to calculate the Wu-Palmer score:

$$Ext\_WuPalmerScore = \frac{2 * depth(join(node1, node2))}{depth(node1) + depth(node2)}$$

$$Int\_WuPalmerScore = \frac{2 * height(meet(node1, node2))}{height(node1) + height(node2)}$$

Moving windows example

The example was generated manually in ArcGIS Pro. An arbitrary spatial extent was selected, with the only requirements being legibility and an interesting spatial diversity. Spatial sub-extents were generated manually by drawing rectangles with the ArcGIS Pro editor. The layers are available in the "moving_windows" folder.