Experimenting with Higher-Order Networks

honyx (HONyx) is a Python package for generating and analyzing Higher-Order Networks models.

- `pip install honyx`

- Further information in the project's gitlab at `https://gitlab.univ-nantes.fr/queyroi-f/honyx`

1. Starting with honyx
   We are going to understand how to use honyx package to build HON models and visualize them
   Use sequences from lecture slides `https://cazabetremy.fr/Teaching/CN/Celestin/toy-sequences.csv`

   (a) Build HON from sequences using the function `generate_hon` with the fixed-order model (`fix-order` parameter) with $k = 1$ and $k = 2$

   (b) Plot them using **networkx** such as information about context sizes and node degrees are showed

   (c) What can you tell about $k = 3$ model?

   (d) Compute PageRank of elements composing the sequences (a,b..) when $k = 2$ using function from **networkx**

   (e) Compare with PageRank computed from `pagerank_hon` function from **honyx**.

2. Wikispeedia
   We now consider sequences representing the Wikispeedia game. In this game individuals tend to join a specific Wikipedia article from a starting point by clicking on links present in articles permitting to reach an other article.
   The set of sequences considers only the top 100 visited pages `https://cazabetremy.fr/Teaching/CN/Celestin/wikispeedia_top100.ngram`

   (a) Make some statistics (size of trajectories, top visited pages, top starting/ending page). Use `read_sequences` function to load sequences.

   (b) What are the top 10 articles according to PageRank applied on the variable-order model ? (`variable-order` parameter)

   (c) What is the article with the highest closeness score? Try to interpret it from input sequences.

   (d) What is the diameter of the network ? Compare it with the data size.
   In case it is not strongly connected, look at the SCC only

   (e) Try to retrieve a long chain from the network (size > 5) and discuss it.