Appendix A : Philosophy

Meaning is a Network Property

Raw data is like a corpse that is not able to communicate. On the other hand, a network is a living and responsive entity.

Thinking deep, we always define complex ideas in relationship to other things. The word “school,” for example, can only be defined through the network of related concepts and meanings such as “teacher,” “student,” “lesson,” “exam,” etc. We can not even define properties of physical objects such as velocity, position, even mass, spin and electric charge of elementary particles without considering their interactions with other particles. For a single free electron in a completely empty space it is impossible to define any physical properties or even argue about its existance. This idea is called Mach’s principle, and has influenced me in understanding the nature of meaning for general kinds of data.

Humans Understand Complex Things Through Hierarchies

If you try to write down the names of the cities you heard in your life, you can list pages of city names. In contrast, remembering a dozen phone numbers or a list of cities of a fictional planet is a much more challenging task.
However, if instead of a mere list, we are given a hierarchical structure or a tree of names, the first level being a list of continents, the second level a list of countries in each continent and the third level a list of cities in each country, something magical happens.

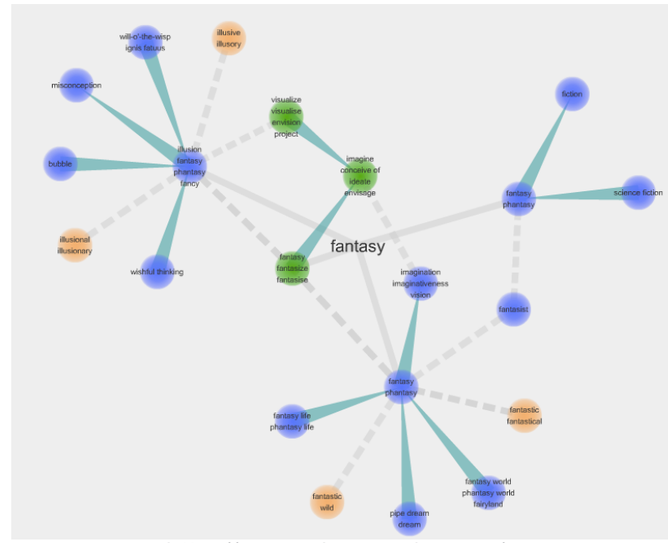
We humans use hierarchies to understand complex things. We assign symbols to different scales and learn the tree of symbols. Many believe that this is due to the hierarchical structure of the neocortex. I used this idea as the foundation for a tool that takes the extracted networks of data and finds communities in the network in a recursive manner.

Hierarchical Aggregation and Visualization

By augmenting raw data with associated networks and hierarchies, one can provide an interface or language with which to semantically communicate and explore.
Extracting the network of phrase co-occurrence provides a hierarchical topic model for the data set. In another example, a network of citations (such as direct and indirect retweets) can help us categorize different eras of an event over time (see Appendix E).

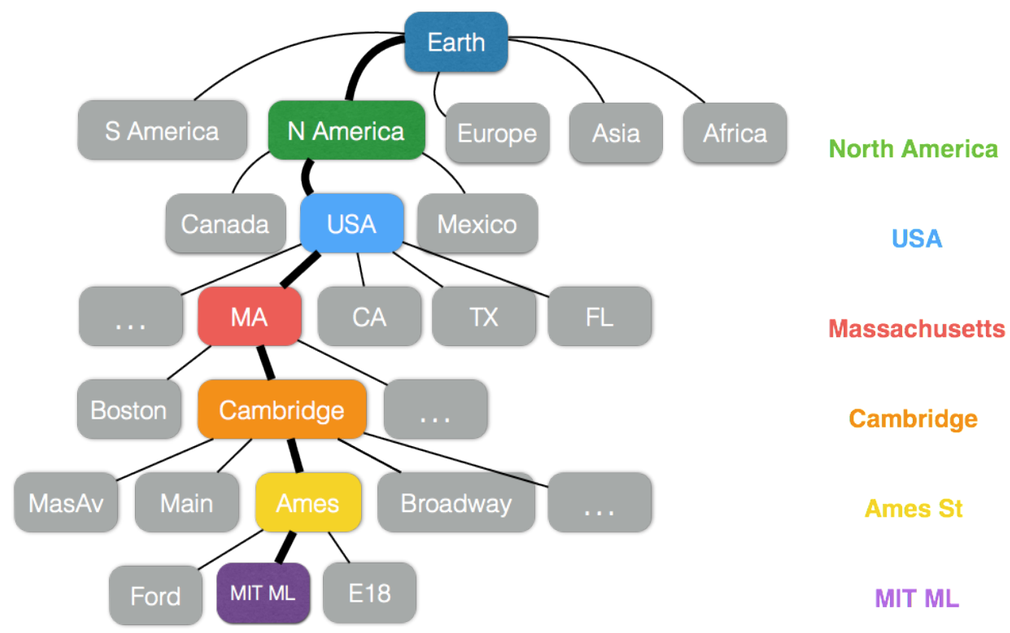
Community detection (CD) in networks provides a mesoscopic (therefore system-level) view for understanding their organization and function. If applied recursively, CD will provide us with a tree structure that encompasses the inherent hierarchy of assemblies in a network. Such hierarchy can help us navigate through different levels of aggregation and abstraction.

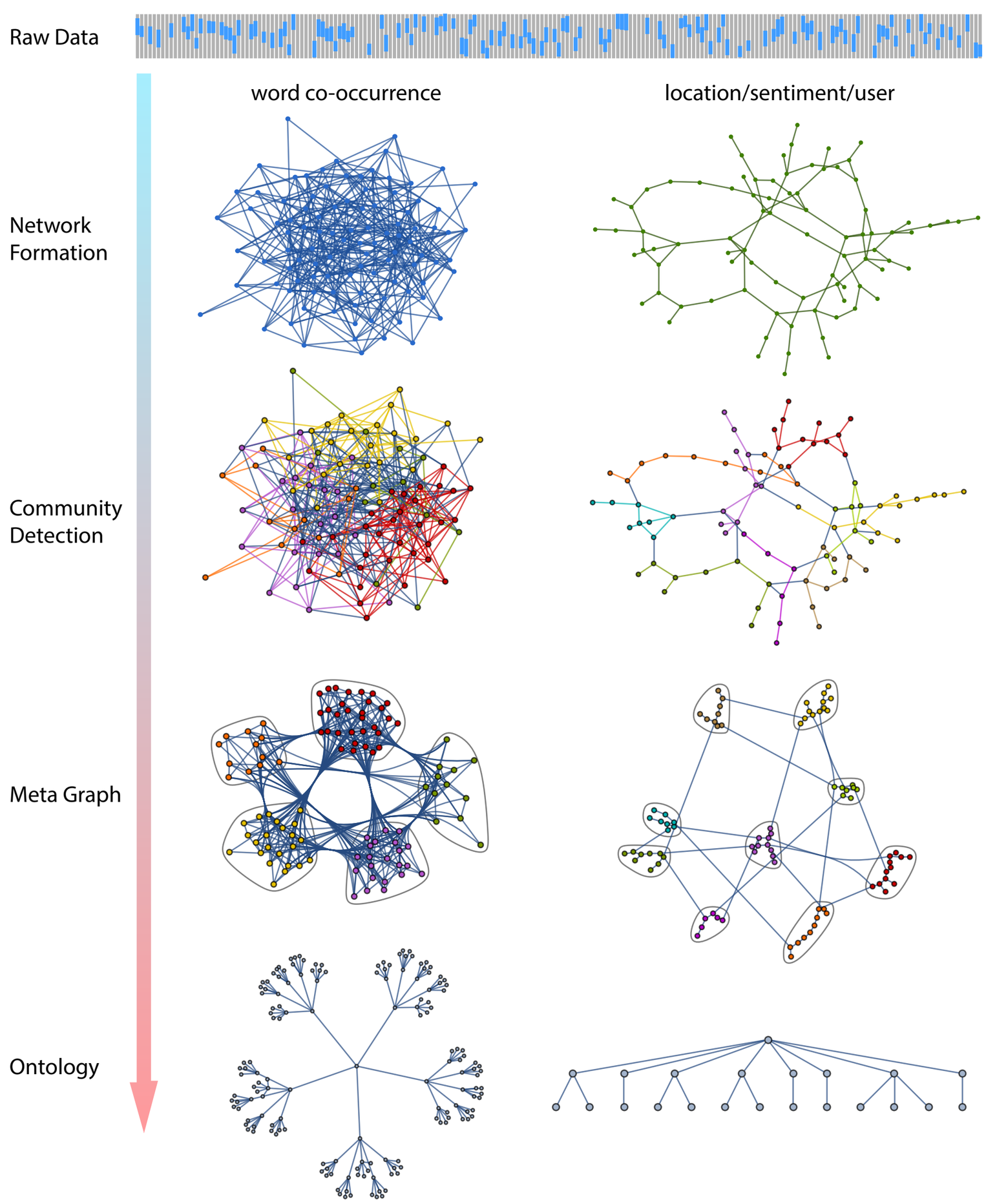
The figure on the right illustrates the process of generating meta graphs and ontologies from raw data. Here we are taking a set of faceboo post or tweets as the raw data and form two different networks based on the content (word co-occurrence) or attributes associated with the posts (say sentiment, geotags, user network etc).
It should be noted here that every node in these networks correspond to a single or multiple posts.



http://www.visuwords.com/

Ernst Mach , 1916





Neo (Mostafa Mohsenvand), MIT Media Lab
Facebook Fellowship Appendix A