
Hands on Text Analytics with Orange

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Orange for Text Analytics

In recent years, the digital humanities community has been introduced to many powerful tools for text analysis, but few of these tools combine powerful data mining and machine learning algorithms within a simple and capable user interface. For flexible and creative analysis, researchers need a tool that focuses on intuition, visualizations and interactivity.

This workshop will introduce participants to Orange, a visual programming environment for data mining, suitable for both beginners and experts. Particular emphasis will be placed on its Text add-on, which offers components for text mining, visualization and deep-learning-based embedding.

This is a hands-on workshop, where the participants will actively construct analytical workflows and go through case studies with the help of the instructors. They will learn how to manage textual data, preprocess it, use machine learning, data projection and visualisation techniques to expose hidden patterns and evaluate the resulting models. At the end of the workshop, the participants will know how to use visual programming to seamlessly construct powerful data analysis workflows, which can be applied to a wide range of challenges in digital humanities.

Structure of the Workshop

Part 1: Visual programming, workflows, data input and preprocessing

First, we will show the basics of Orange: how to load the data, inspect and visualize it. Participants will

be introduced to several options for data import, from standard Corpus to Twitter, Guardian and Text Import. Once the corpus is loaded, we will preprocess it and display the result in a word cloud. A particular emphasis will be on the use of custom preprocessing techniques and how to successfully apply them to the corpus. The results of each technique will be observed in an interactive word cloud and concordances.

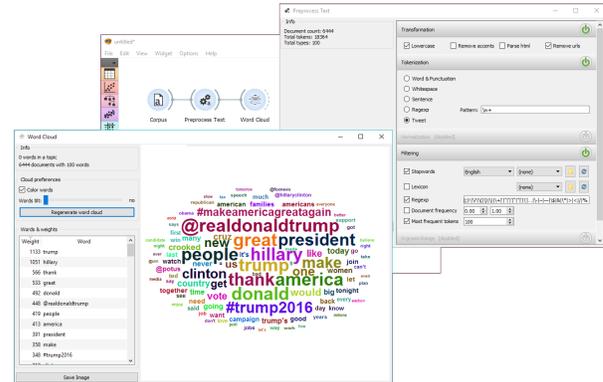


Figure 1: Preprocessing results displayed in a word cloud

Part 2: Machine learning and deep-learning-based embedding for predictive analysis

Next, we will use Twitter data to construct an author prediction pipeline and test some classifiers. We will fetch author Timelines from Twitter and observe the retrieved corpus. This time we will introduce a pre-trained tweet tokenizer and pass the preprocessed corpus through a bag of words. We will discuss bag of words parameters and how to best prepare the data for further analysis. The results of using different parameters will be observed in a data table to understand the underlying data structures. For comparison, we will use deep-learning-based embedding to derive vector representation of tweets and in this way enable machine learning.

We will explain how we can use machine learning in text mining and introduce a number of techniques for predictive analysis. We will use cross-validation to test the constructed bag of words models and compare classification scores for each algorithm. We will discuss the quality of constructed models and what scores are usually the best for observing model quality. Additionally, we will inspect misclassified tweets in a confusion matrix and even further in Corpus Viewer, to leverage the possibilities of a close(r) reading.

Part 3: Data clustering, sentiment analysis, image and geo analytics

In the third part, we will work on geomapping and image analytics. We will transform textual and visual data into feature vectors and plot these data onto a world map to discover interesting relations.

We will discuss how to acquire geolocated data from Twitter and why this is useful. Next, we will use geotagged Twitter data and apply a pre-trained sentiment analysis model to acquire sentiment orientation. We will map the sentiment-tagged tweets and explore how to use sentiment together with geomapping.

Finally, the participants will be introduced to image analytics for humanities research. We will explain why and how to transform raw images into multidimensional vectors and how to work with the new data. We will cluster Instagram images into groups and explore how to map image-containing tweets on a world map. Do images correspond to geolocation? We will see.

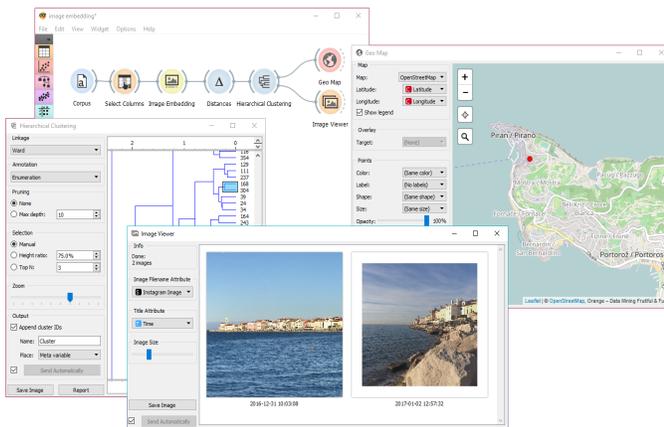


Figure 2: Images from social media are embedded with ImageNet embedding, clustered with Hierarchical Clustering and displayed on a map by their geolocation.