

Visual Analysis of Text Annotations for Stance Classification with ALVA

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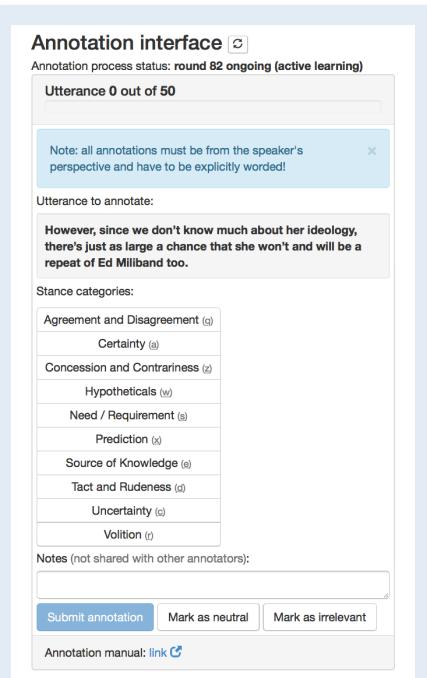
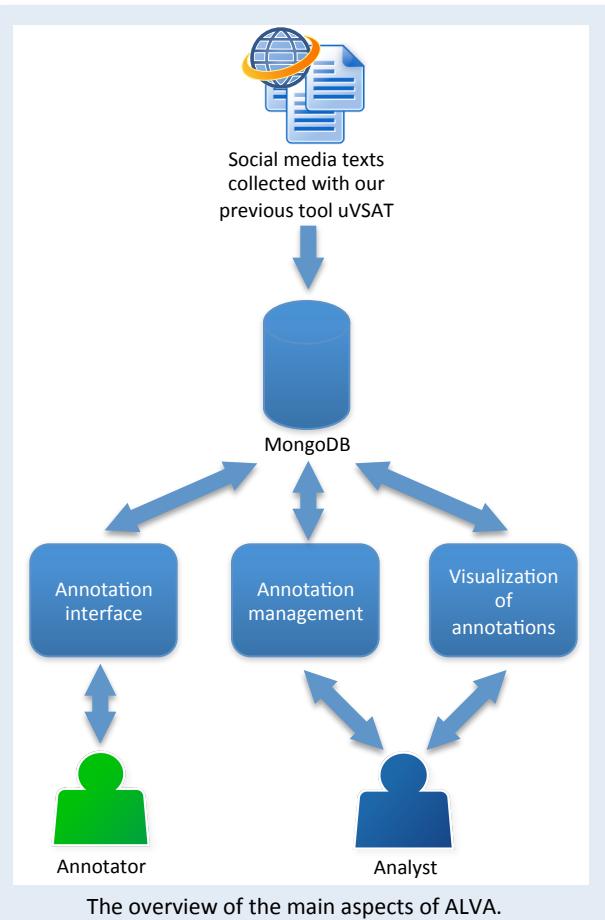
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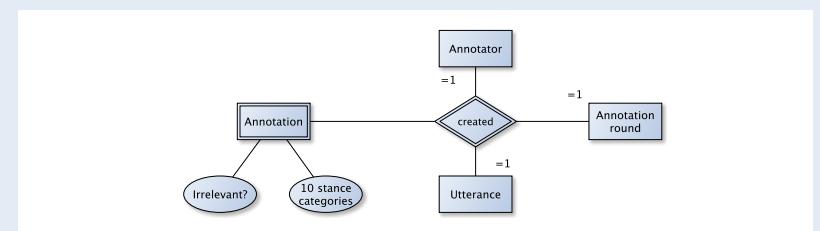
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The automatic detection and classification of stance taking in text data using natural language processing and machine learning methods create an opportunity to gain insight about writers' feelings and attitudes towards their own and other people's utterances. However, this task presents multiple challenges related to the training data collection as well as the actual classifier training. In order to facilitate the process of training a stance classifier, we propose a visual analytics approach called ALVA for text data annotation and visualization. Our approach supports the annotation process management and supplies annotators with a clean user interface for labeling utterances with several stance categories. The analysts are provided with a visualization of stance annotations which facilitates the analysis of categories used by the annotators. ALVA is already being used by our domain experts in linguistics and computational linguistics in order to improve the understanding of stance phenomena and to build a stance classifier for applications such as social media monitoring.



Screenshot of the web-based annotation interface of ALVA. Annotators are presented with a single utterance at a time. They can label it with one or several stance categories, label it as neutral (no stance), or label it as irrelevant (e.g., if the text contains only URLs or numbers).

Our current data set comprises about 8,000 annotations of utterances in English (in most cases, individual sentences) collected from social media on political topics such as the US election. The annotations were performed by several annotators during multiple annotation rounds.

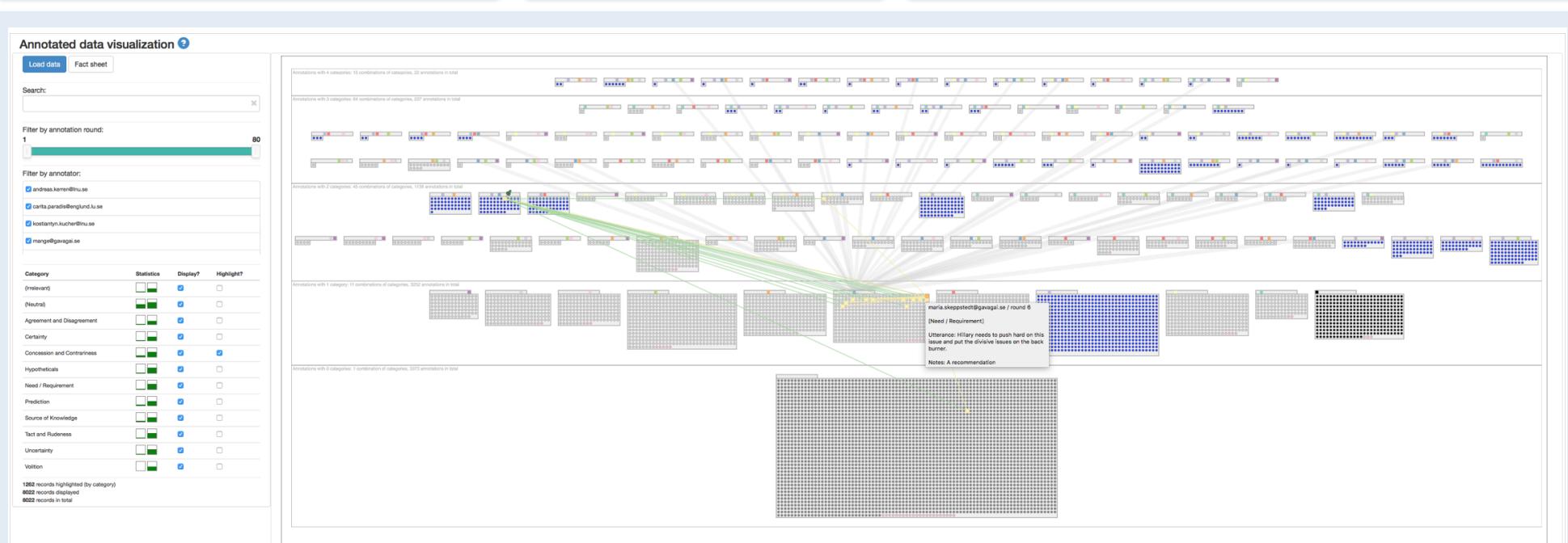


As displayed in the Entity-Relationship diagram, a single annotation corresponds to a combination of annotator, annotation round value, and actual utterance.

The analysts (researchers in linguistics and computational linguistics) are interested in the following questions corresponding to visualization tasks:

- Are there many annotations marked as neutral and irrelevant?
- What is the distribution of individual stance categories in the data?
- Are there many annotations labeled with multiple categories?
- Which stance categories tend to co-occur in annotations?
- Is it possible to compare annotations made for the same utterances?

We have designed a representation called *CatCombos* for our visualization which is based on the ideas of semantic substrates and set visualizations. It focuses on the groups of annotations rather than individual annotations to provide overview. By combining it with dynamic queries, details on demand, and highlighting links between annotations made for the same utterance, the analysts can use ALVA for exploratory visual analysis of the annotated data.



Visualization of about 8,000 text annotations in our system ALVA with the *CatCombos* representation. Each annotation represented by a colored dot can be labeled with up to ten stance categories in our concrete use case. Annotations are grouped together into rectangular blocks by the combination of categories which occur in the data set. Thus, the block groups form layers: the top layer contains 15 annotation blocks labeled with four categories simultaneously, and the bottom layer with a single block solely contains neutral annotations. Color-coded rectangles in the block headers represent the corresponding sets of categories. Here, all annotations related to the category *Concession and Contrariness* are highlighted in blue.

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