

Focused Entailment Graphs for Open IE Propositions

Dataset Annotation

Omer Levy[†] Ido Dagan[†] Jacob Goldberger[§]
† Computer Science Department § Faculty of Engineering
Bar-Ilan University
Ramat-Gan, Israel
`{omerlevy,dagan,goldbej}@{cs,cs,eng}.biu.ac.il`

Manually annotating 1.5 million pairs of propositions is inefficient. Instead, we used a semi-automatic annotation process, which dramatically narrows down the number of manual decisions, and hence, the required annotation time.

Each graph (topic) was annotated separately. The process begins by showing the annotator a list of all the arguments in the graph, and asking her to cluster them into equivalence sets. An argument cluster might be $\{influenza, flu\}$.

For each argument cluster, the annotator receives a list of all the propositions in the graph containing its arguments. Each proposition has two fixed arguments: the topic, and the cluster argument. A list of such propositions might look like this:

Topic: *vaccine*

Cluster: $\{influenza, flu\}$

Propositions:

- $(vaccine, protect\ against, influenza)$
- $(influenza, prevent\ by, vaccine)$

Given a single argument cluster and matching proposition list at a time, the annotator's task is to cluster the propositions. Since both arguments are fixed within each proposition, and only the predicate changes, this stage is really an annotation of predicate equivalence in the context of the given arguments.

We now possess a set of proposition clusters, which is usually 3 to 5 times smaller than the original set of propositions. This reduces the complexity of

the next stage – annotating proposition entailment. The annotator is given a list of all the proposition clusters, each represented by a single proposition; her task is to mark all the entailment or equivalence relations between them.

After completing the manual phase, an automatic process suggests additional annotations to create the transitive closure. This means that if according to the annotation s_i entails s_j and s_j entails s_k , then the annotator is asked whether s_i also entails s_k . In our dataset, all suggestions were accepted, and the resulting entailment graphs are fully transitive, as expected by the nature of entailment for complete propositions.

The annotation process was carried out by two native English speakers, with the aid of encyclopedic knowledge for unfamiliar medical terms. The agreement on a subset of five randomly sampled graphs was $\kappa = 0.77$. Annotating a single graph took about an hour and a half on average.