# Projecting of the text document searching system: indexation using graph structures.

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# Agenda



Agenda
Introduction
Conceptual Graphs
Our approach
Abilities
Conclusion

# Introduction to the topic
# Case study: HowTo startup



- ✔ Current information searching methods;
- ✔ Role of wikipedia in current world;
- ✔ One website to rule them all.

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- ✔ Navigation searching (categories, links);
- ✔ Attribute searching (tags, date created, author);
- ✔ Full text searching.

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- ✔ Might be relevant...
- ✔ Might be fast...
- ✔ ...might take much resources...

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Let's try graphs!

# What about conceptual graphs?



Conceptual graphs are well described, both for saving knownledge and searching systems.

There are many disadvantages of auto-creating CG's from pure text:

- ✔ Takes much resources.
- ✔ Disambiguations can occur.
- ✔ Best current available ideas bases on other semantic solutions.

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# Our approach to the searching.



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We want to simplify the idea of conceptual graphs.

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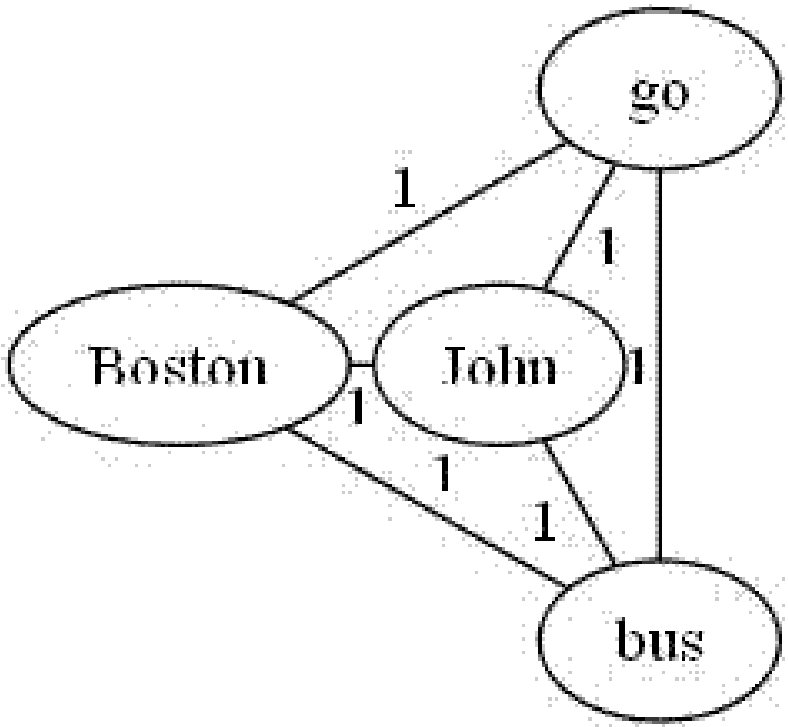
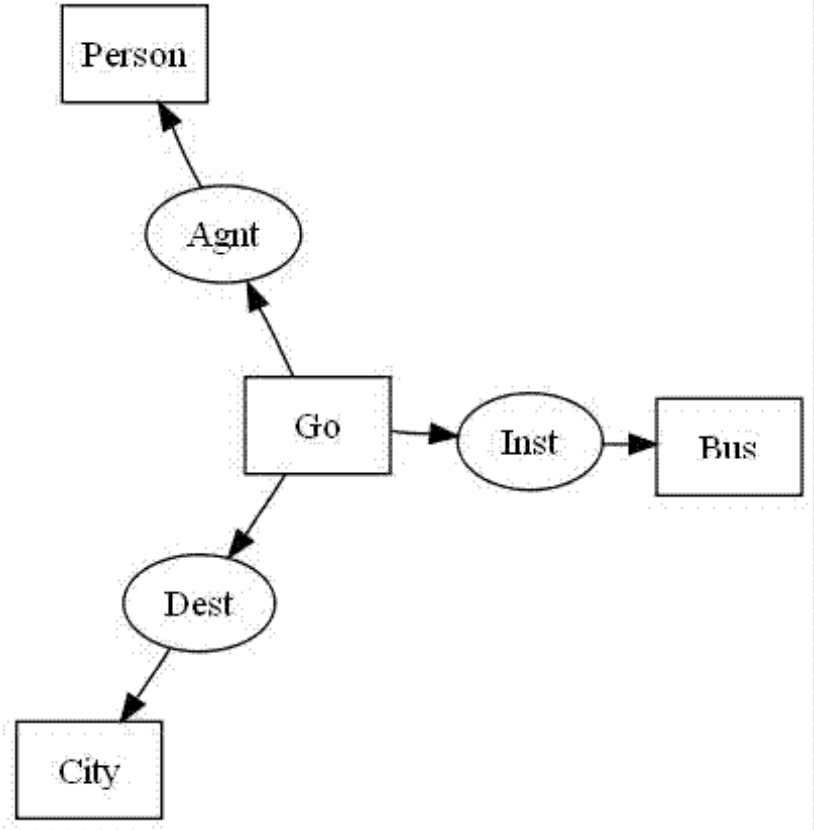
We would like to have vertices as terms, connected themselves with edges labelled by value of frequency and neighbourhood. To make searching easier, those weights will be normalized and quantified.

# Conceptual graphs compared.



John is going to Boston by bus.

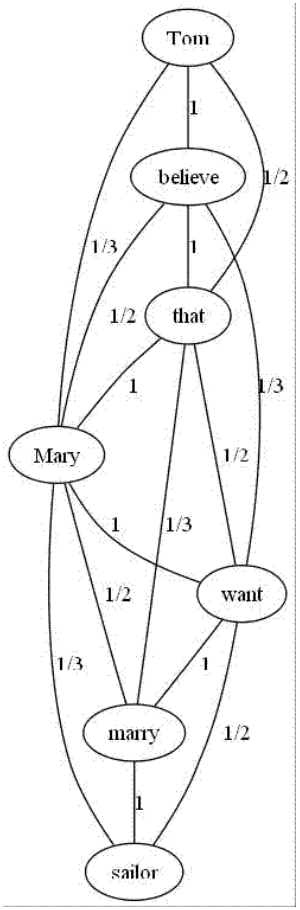


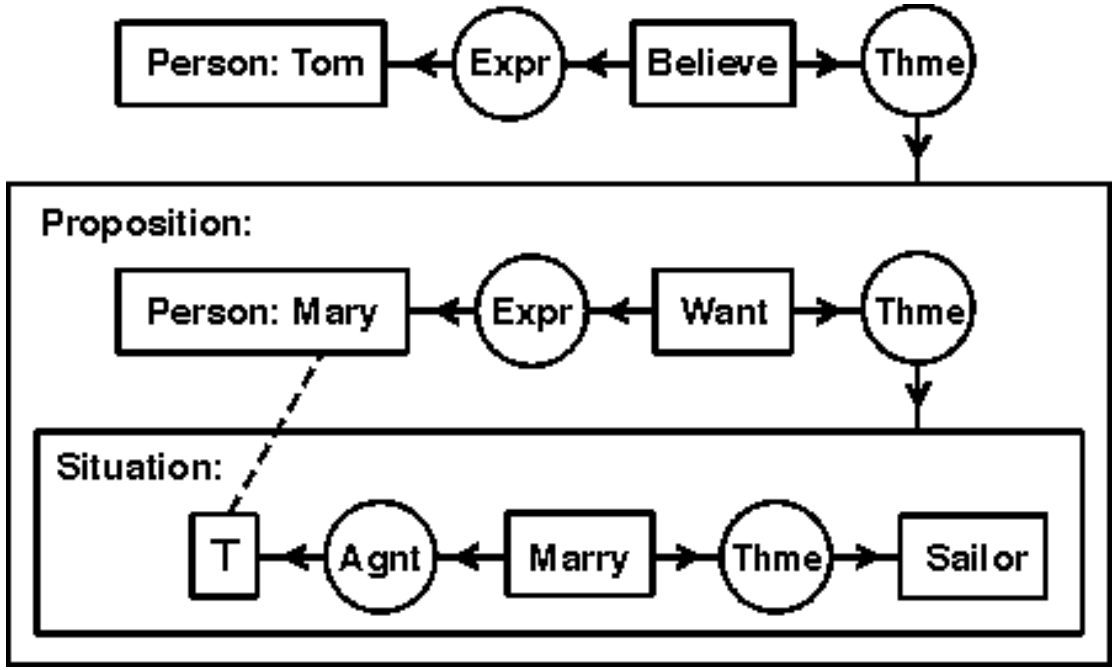



# Conceptual graphs compared.



Tom believes that Mary wants to marry a sailor.



# Core indexation functions



$\delta : D \rightarrow S'$ - document $\rightarrow$ subset of set of words which are in language with repetitions.

$\phi : S \rightarrow T'$ - basic form of each word in document is being found.

$\gamma : T' \rightarrow G$ - basing on terms our graph structure is being created.

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Search engine bases on user's query, and all queries (such as boolean queries) can be adopted for proposed system.

# Abilities of the system: Recommendations



Recommendation system based on graph comparing.

Two types of measures: similarity and inclusion.

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Recommendation system based on graph comparing.

Two types of measures: similarity and inclusion.

# Similarity measure



Combination of conceptual and relational similarities - comparing vertices and edges.

$$\theta_s(G_1, G_2) = \frac{1}{2}\left(\frac{2n(G_i)}{n(G_1) + n(G_2)} + \frac{2m(G_i)}{m_{G_i}(G_1) + m_{G_i}(G_2)}\right) \quad (1)$$

Continuous, defined on range $[0, 1]$, with value 1 when graphs are conceptually identical, and 0 when they are completely different.

# Inclusion measure



Modification of similarity measure.

$$\theta_c(G_1, G_2) = floor(\frac{n(G_i)}{n(G_1)} + \frac{m(G_i)}{m_{G_i}(G_1)}) - floor(\frac{n(G_i)}{n(G_2)} + \frac{m(G_i)}{m_{G_i}(G_2)}) \quad (2)$$

Digital, with results within $-1, 0, 1$. If intersection is identical to $G_1$ it's $1$, $G_2$ - $-1$, and in all other cases $0$.

# Conclusion



- ✔ Presented indexation method bases on different types of basic index.
- ✔ First implementation tests confirmed usefulness of the system.
- ✔ Developed recommendation system has various ways of usage.

Further work

- ✔ Recomendation system as proposed after small changes can be useful while searching for plagiarisms.
- ✔ Size of neighbourhood and weights of edges could depend on the document (it's size, diversity).