On Fuzzy Symbols

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Document Version History

Current version: V2

Version	Date	Comments
V1	2010-11-02	Start
V2	2011-06-15	Shortest paths

1 Introduction

1.1 Semantic networks

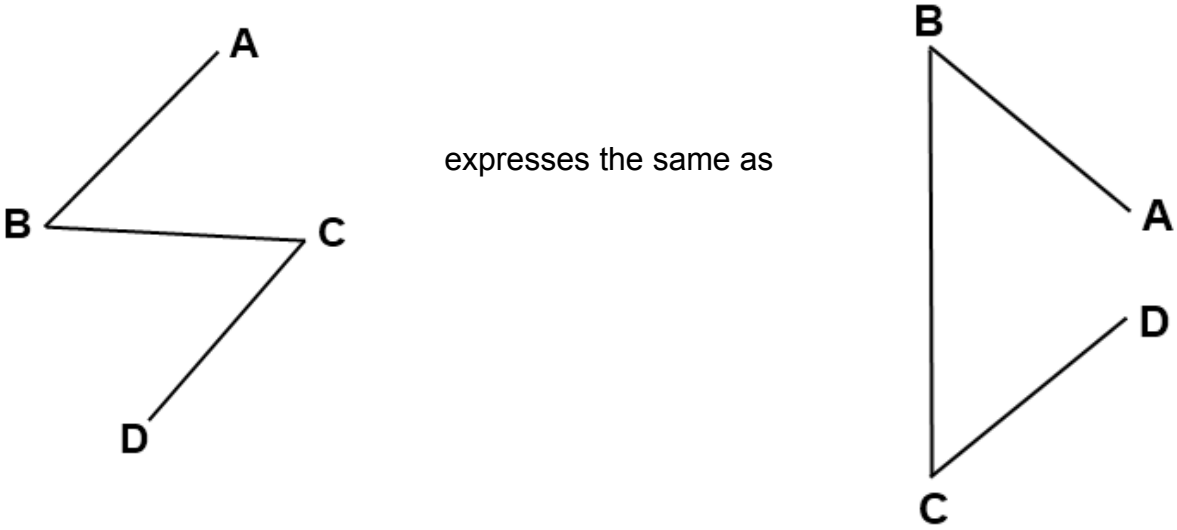
A semantic network is a graph, consisting of nodes (aka vertices) and edges, that expresses the meaning of objects (represented by the nodes) via appropriate binary relationships, encoded by the edges.

Within the scope of this document, each node represents a unique symbol (word), and an edge represents a relationship. Here, the relationships are not named, allowing the bidirectional interpretation “has something to do with”.

1.2 Shortest paths

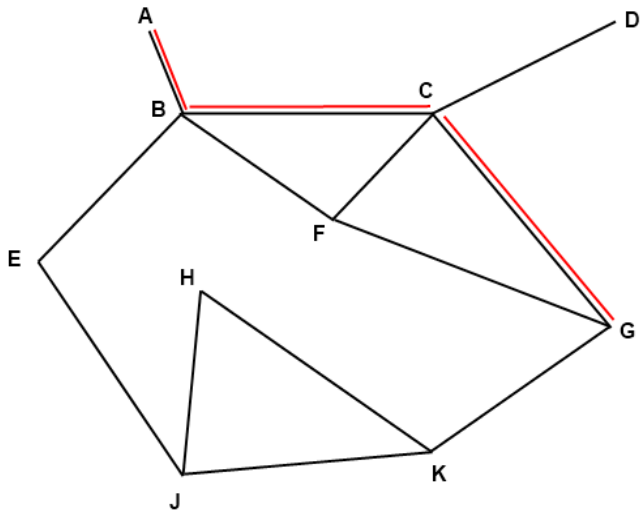
Routing planners such as in Google Maps [GO11] provide different options for calculating a shortest path, for example the possibility to avoid certain roads or street tolls. Likewise it is possible to define shortest paths through a graph in an infinite number of ways.

Geometric distances don't matter.



1.2.1 The number of traversed edges distance

The most natural distance measure that comes into mind seems to be the least number of edges that have to be traversed from the start node to the end node.

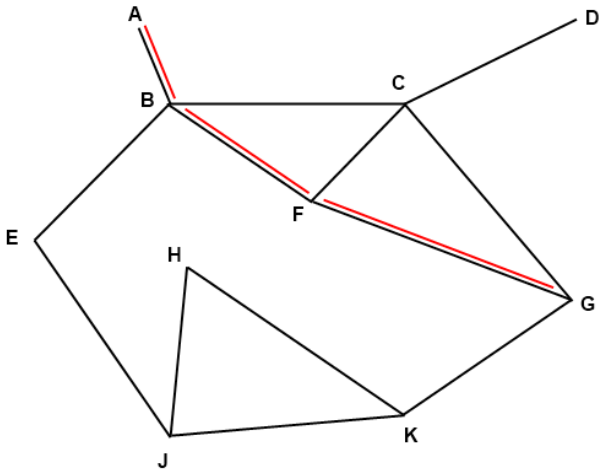


In this case, a shortest path from A to G is A-B-C-G, and the distance is 3, since three edges are involved. As can be seen, this definition doesn't yield a unique path. A-B-F-G would also be possible.

1.2.2 The EdgeSum distance

Another idea for defining a shortest path is to find a sequence of nodes where the sum of the number of edges that are connected to the inner nodes is minimal.

As a rationale one might argue that is a good idea on a journey that has to be as fast as possible to avoid traffic centers.



Inner nodes on the path A-B-F-G are B and F. B has 4 edges, F has 3, so the distance is 7. The path A-B-C-G has a distance value of 8, since B has 4 edges and C as well.

Literature and further references

[GO11]	Google Maps, June 15, 2011 Online: http://maps.google.co.uk/