Loops in real-world graphs

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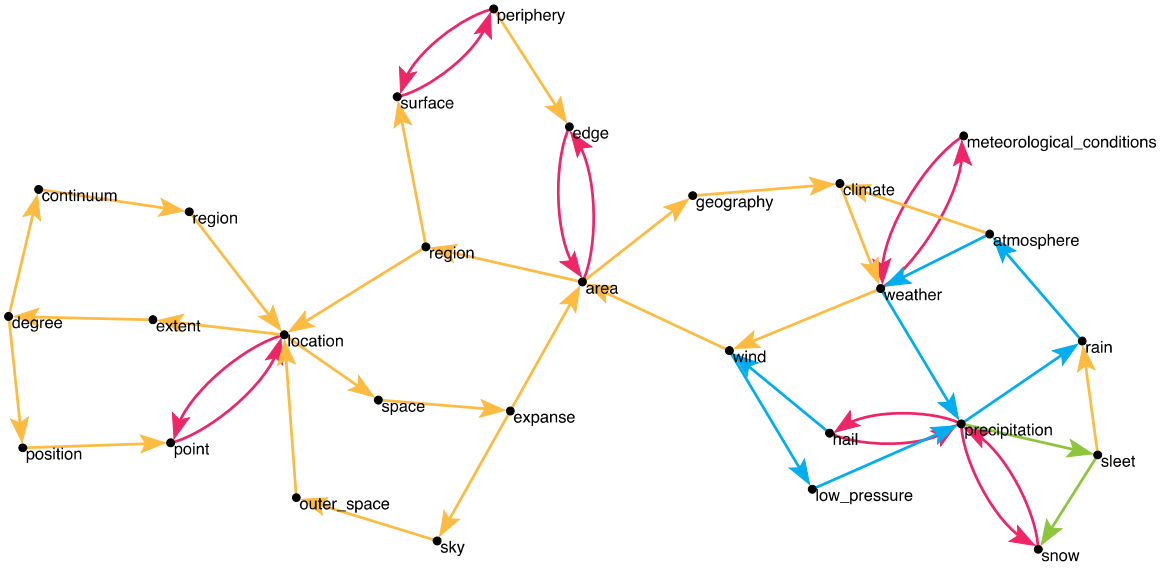
Most theoretical approaches treat graphs as though they were trees, though in practice we know that loops abound in real-world graphs. Using examples from the WWW, e-mail and language, we investigate the role of loops in the functionality of physical graphs. Focusing on dictionaries, we look at the graph that links a given word to the set of words included in its definition, which in turn point to further descendants. Iterating through definitions in this way, one typically finds that definitions loop back upon themselves and that dictionary graphs are much more "loopy" than the conventional random graphs. We find that the emergence of loops signals the introduction of a new concept into language, and discuss the implications for the evolution of language.



An example of a large connected component in the decomposition of the dictionary's core. Arrows are drawn from a node to words in its definition. Red links appear first in two-loops, green in three-loops, blue in four-loops, and orange in five-loops.