

“Where do you go from here?” Semantics of directions in biological pathways.

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WikiPathways is a core public resource for curating biological pathways. It currently contains 2,236 pathways for more than twenty different species. WikiPathways RDF has proven to be useful for curation purposes and to rapidly find pathway elements. This allows, for instance, finding pathways with specific drug targets or known to be related to specific diseases using the Open PHACTS platform. Besides the pathway elements, it is crucial to also include information about the interactions between nodes (genes, proteins, metabolites, etc.). The biomolecular nodes of the graph are connected by edges creating an abstract network. These edges can have information that is important to describe the interactions. A line in a pathway connecting two molecules with an arrow implies information about the interaction. The key benefit is that the arrow connecting the pathway elements provides information about a pathway's directionality. In the pathway diagram this offers a visual cue for the reader. Within the new RDF, information about the edges is now present in a machine readable way. Describing the interaction and the directionality of the interaction gives new insight into pathways. It is now possible to query the WikiPathways RDF to find information about gene products that are either upstream or downstream of the gene product of interest, in one or more pathways. This, for example, exposes potential drug targets within the same pathway in a computer readable way. The same process can also be used for metabolites to find products or substrates, or for any other type of data node that is present in a pathway. Now that all this has been done, it is possible to use this new RDF information to traverse a WikiPathways pathway step by step.

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