Twined Language Specification

Lucas Weissman Zach Sturdevant

April 28, 2024

Introduction

”Twined” represents a transformative approach in how we manage and interact with textual information. By converting unstructured text data from diverse note-taking formats into structured, navigable knowledge graphs, ”Twined” provides a unique visual perspective that enhances comprehension and analysis.

Rules: Graph Rule: x, y, x, z → x, z, x, w, y, w, z, w

Hypergraph Rule: x, y, z → x, u, v, z, v, w, y, w, u

graph: Sunlight,Plant Growth,Water,Plant Growth,Soil Nutrients,Plant Growth

hypergraph: Sunlight,Water,Soil Nutrients,Plant Growth,Temperature,Humidity,Water,Plant Growth

Delete this TODO and replace with 2+ paragraphs.

Brainstorming Section:
“Twined” intertwines user’s information by managing and interacting with textual information. It converts unstructured text data from various note-taking formats into structured, navigable knowledge graphs. This will allow users to quickly visualize connections and gain insights that might be missed in traditional textual data formats.

A hypergraph is defined as a collection of nodes and hyperedges, where each hyperedge has the capability to connect three or more nodes, unlike traditional graphs where edges connect only two nodes. In terms of mathematical representation, edges in standard graphs are noted as pairs of numbers within curly brackets, such as 1, 2. Conversely, in hypergraphs, hyperedges that connect multiple nodes are denoted by three or more numbers within curly brackets, for example, 1, 2, 3. Visually, in graphs, edges are depicted as connections between white dots (nodes) using white arrows (edges). Hypergraphs extend this visualization by linking three or more white dots (nodes) with multiple arrows and a transparent white web, highlighting the complex relationships between nodes.

PS. We might adjust the intro to fit within the context of our current deliverables, or we could state the end goal briefily and current stage we are in with the test cases we have built. - Lucas

Design Principles

Delete this TODO and replace with 1+ paragraphs.

Brainstorming Section:

Examples

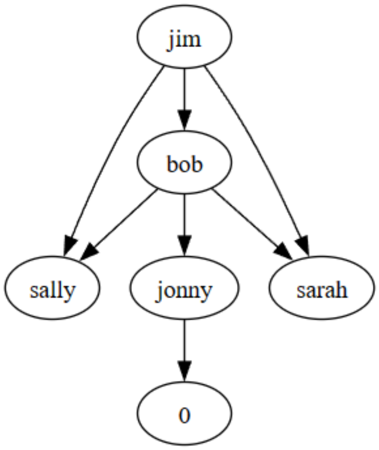


Figure 1: Family Relationship

This graph represents the relationships between family individuals. Each node represents a person, and each edge represents a direct relationship between two individuals. For example, ”bob” has relationships with ”sally,” ”jonny,” and ”sarah,” as depicted by the edges connecting their respective nodes.

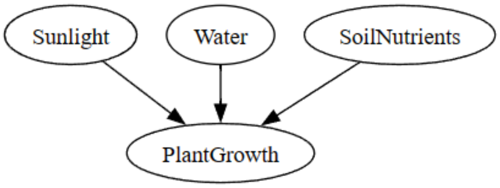


Figure 2: Plant Growth Relationship

The graph represents factors affecting plant growth. Each node represents a factor such as ”Sunlight,” ”Water,” and ”Soil Nutrients,” and each edge represents the influence of these factors on ”Plant Growth,” as depicted by the edges connecting their respective nodes.

Delete this TODO and replace with 3+ examples and accompanying descriptions.

Brainstorming Section

I have added above an example of image insertion from one of our test cases, we could replace it with a few more/new ones. - Lucas

Language Concepts

The language concepts behind ”Twined” incorporate elements from graph theory and data visualization to support the creation of knowledge graphs and hypergraphs. These concepts are integral in defining how textual data is parsed, how entities within the text are identified as nodes, and how relationships (edges) are established based on the context and content of the data. This allows ”Twined” to dynamically interpret and display information in a way that highlights both hierarchical and associative relationships.

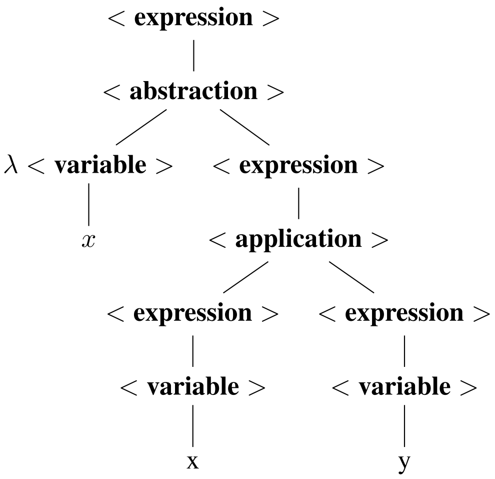
Delete this TODO and replace with 1+ paragraphs.

Brainstorming Section
Terms to be used/contextualized: Graph Theory Data Visualization Knowledge Graphs Hypergraphs Parsing Nodes Edges Hierarchical Relationships Associative relationships

Formal Syntax

< **expression** >	::=	< **Node** >
	|	< **edgeList** >
	|	< **nodeName** >
	|	< **listOfNodes** >
< **Node** >	::=	{ < **String** >, < **nodeName** > }
< **nodeName** >	::=	< **String** >
< **edgeList** >	::=	(< **nodeName** > +)
< **listOfNodes** >	::=	< **Node** > +

Delete this TODO and replace with BNF.



Brainstorming Section

Semantics

Delete this TODO and replace with as much text as is needed.

Brainstorming Section