

[0015] This patent application details the Ontology Editor System, a back office system that has been specially designed to build the Ontology for the Research System, and, on the basis of the Ontology, build the data structures that can be the foundation of the Research System's performance and capabilities. This extensive library - the Ontology - can be static or dynamic. In a dynamic library, the data structures may be dynamically changed over time to add data, take away data, and reorganize the data. Further, the library could be a hybrid library wherein at least one portion of the library may be static while at least another portion of the library is dynamic. Using this extensive library of mathematical concepts, the Ontology Editor System can apply unique search, data-mining and text-mining algorithms and a graphic user interface to provide the public with a Research System of substantial and unique capability. Mathematics analysts can work with the Ontology Editor System to develop upgrades to the Ontology and upload successive releases to the Research System.

According to an embodiment of the invention, a computer implemented math research system is provided. The computer having at least one database and at least one processor, comprising the steps of:

- _____ selecting a math problem for analysis;
- _____ identifying a plurality of concepts contained within the math problem;
- _____ expressing concepts as word phrases resulting in a plurality of word phrases, said word phrases defined to be concept line items;
- _____ entering said concept line items into a database;
- _____ said at least one processor mapping said plurality of concept line items into a predefined organizational structure, said organizational structure including a plurality of the concept line items as nodes;
- _____ determining the prerequisite or dependency relationship of a first node with respect to a second node and said at least one processor expressing the relationship as a uni-directional arc;
- _____ determining the prerequisite or dependency relationship of a third node with respect to the first and second nodes and said at least one processor expressing the relationships as uni-directional arcs;
- _____ said at least one processor mapping said uni-directional arcs into a node-arc incidence matrix, said node-arc incidence matrix defining the prerequisite or dependency relationship of at least one concept line item with respect to at least another one concept line item; and

storing the node-arc incidence matrix in a retrievable database from which said at least one processor may identify and retrieve the relationship information of at least one concept line item with at least another one concept line item.

[0016] This patent application also details the Research System, a user-facing online system that renders the Ontology searchable by several query methods, extensible by automated online searches integrated with the Ontology Editor and its processes, and interoperable with many forms of multi-media content.

BRIEF DESCRIPTION OF THE FIGURES

[0017] The above and related features and advantages of the present disclosure can be more fully understood by reference to the following figures and the detailed description of the preferred embodiment below.

[0018] Fig. 1 is a depiction of a tiered architecture for the Ontology Editor System and Research System as connected to the Internet.

[0019] Fig. 2 is an exemplary segment of a node-arc incidence matrix depicting prerequisites and dependencies among exemplary concept line items.

[0020] Fig. 3 is a graphic synopsis of an embodiment of the math concept extraction and Ontology assembly process.