

The Visual Glossary as New Information Technology for Science Education

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The dominant feature of globalization is the power and ubiquity of new global technologies. Internet resources provide diverse perspectives on ways in which education is being shaped by global processes. Most people consider Internet their primary source for correct information. The most successful Internet provider to fast, reliable, accurate information is Google. It would be also convenient to have a specialized provider to science information that could be used for science education.

We are introducing a potentially revolutionary alternative to the standard Internet search engine Google that has been developed at Institute of Information in St. Petersburg Russian Academy of Science (SPIIRAS). This search engine is referred as a Visual Glossary or “VisGloss”, and it provides the instant visual access to scientific and professional information.

The VisGloss is designed to improve search for different areas of professional and educational endeavors. The most important advantage of this alternative search engine is that it provides an access to information in interactive visual mode showing every term linked to the given topic. Visual interface creates a visual semantic environment for each term needed to be defined and forms the dynamic visualization of the context. The VisGloss allows user to find information quickly by following semantic connections that surround every term linked to the topic. It provides quicker search, faster and more intuitive understanding of the topic.

The VisGloss can pretend to become a leading provider of encyclopedia service for scientists and educators. It will also be very advantageous if the VisGloss search engine focuses exclusively on all aspects of science and engineering disciplines. We believe this specialized search engine will attract the scientific community – universities, research and development groups, etc.

A glossary for the search engine VISGLOSS

Computational information technologies can be applied to any professional subject area, such as physics, mathematics, etc. All educational textbook contain key words and definitions related to topics of subject area which form thesaurus and glossary listed in special vocabulary or sometimes at the end of a textbook. These glossaries are used to form a basis for the VisGloss.

The key process of creating a topic glossary is selection of the most informative terms and definitions related to the topic that results in compilation of sets of meaningful entries that

form multiple varieties of related terms. The most interesting entries are those that carry the definition of new and most modern terms and that form connections between the old and new ones. That requires constant update and collaborative efforts of professional experts in related subject areas.

The mathematical model that was chosen for text analysis could be broadened and defined more precisely with a new data acquisition. A list of all terms used in the subject's topic is arranged according to their defined informative priority. On the basis of this list the semantic model of the topic showing the relationship between the terms is presented in form of a dynamic visual graph.

The dynamic visualization of a context

The dynamic visualization is the method that constructs a semantic environment for a specific subject area (Mathematics, Physics, Engineering, Biology, Chemistry, etc.) by forming bonds between related terms.

Adding interactive visual interfaces to an information system allows creating an informative environment for a quick acquaintance with the subject area. Such a system forms a multiple variety for all terms used in the given subject area, and it rearranges them by their informative priority assigned.

The visual representation of information is an analogy to the hieroglyphic encryption: it allows accepting the structure of connections as a whole.

The VisGloss at a glance

To encourage recognition and adoption of the VisGloss, its demonstration version was created. Meaningful descriptions of selected words were taken from the Webster's dictionary to form basis for the visual semantic environment.

For each chosen word, the dynamic diagram for semantic development of the word is built. It creates a graphical picture of semantic connections to the word which forms the visual environment of the context. This visual picture helps to understand the sense of this word at a glance with help of defined terminology, as well as to find quickly the main word and its meaning. Moving along the semantic environment of the word along with the visual interface one can be quickly acquainted with the topic under investigation.

The surrounding connections of all words are formed with help of a programmed analyzer. The programmed analyzer could make some mistakes, such as selecting terminology

that belongs to a different subject area and does not relate to the given topic. Improving the analyzer operation algorithm will allow to reduce the number of such errors.

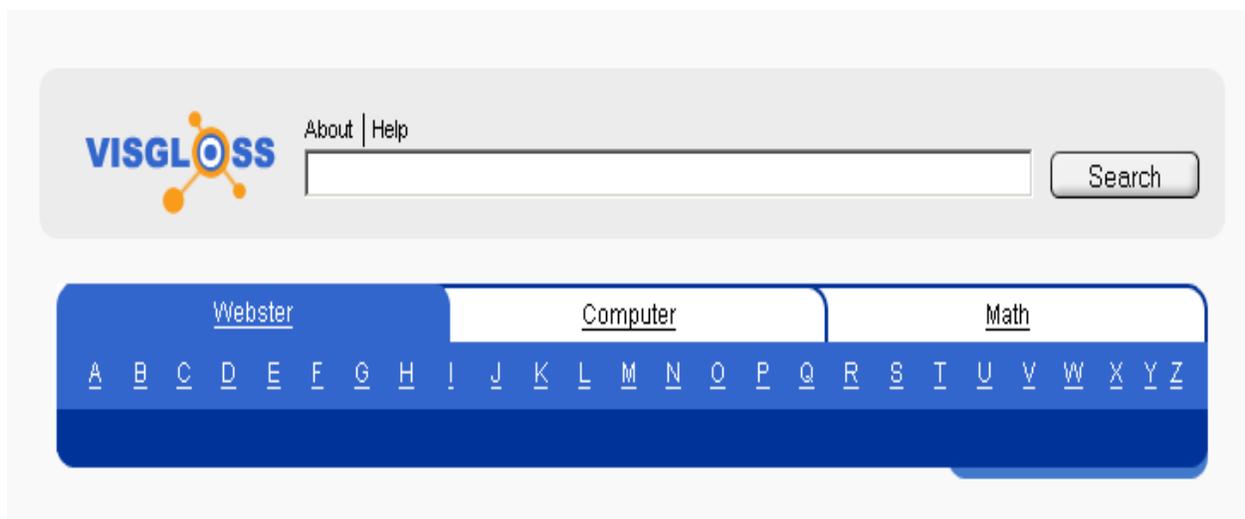
The programmed analyzer contains a special build-in searching service which allows fast search of the word when searching simultaneously through all information divisions available in the system.

On-line version of visual glossary is available at <http://www.vslovar.org.ru>. However, the VisGloss search engine was first developed in Russian. To promote the VisGloss search engine for widespread adoption, a version of the VisGloss search engine with user interface and morphology in English is under development as the first part in a group of semiotic information system resources for science education.

The diagram below represents the Russian version with topics translated. Topics on physics are available at <http://www.phys.vslovar.org.ru>.

Demonstration

<http://visgloss.com/89861.html>



SCIENCE

SCIENCE - (n.) Accumulated and established knowledge, which has been systematized and formulated with reference to the discovery of general truths or the operation of general laws; knowledge classified and made available in work, life, or the search for truth; comprehensive, profound, or philosophical knowledge.

