Argumentation visualization: development through the ages essay

Report on the course “ Knowledge Structuring” “ Argumentation Visualization” Saint – Petersburg 2013 Abstract This essay reviews development and current state of the argumentation visualization concept Ana tools. Argumentation valuations Is a set AT metazoans uses to represent complex systems of preconditions, reasons and conclusions via visual tools, such as graphs, diagrams, matrices, charts etc.

The overview uses the inductive immersion approach: argumentation visualization phenomenon understanding is gained by allowing the history of method’s development and absorbing most influential thoughts that contributed to the approach in question throughout the centuries. The milestones of visual reasoning are highlighted, several examples of argumentation visualization tools are provided. Description of the today’s state of argumentation visualization method, known as CASSAVA, follows the historical reference. A short market overview is given further.

An overlook of the main trends that define further development of CASSAVA and main points of criticism of the method conclude the work. Table of content History of argumentation visualization Before we start, it would be appropriate to give a short definition of the concept in question. Argumentation visualization can be described as a set of methods used to represent complex systems of preconditions, reasons and conclusions via visual tools, such as graphs, diagrams, matrices, charts etc. A simple mind-map in Fig. 1 highlights main topics the essay will touch in regard to argumentation visualization history.

Early precursors of argumentation visualization For a long time (for more than a thousand years, to be more precise) science of logical seasoning transmission was limited by knowledge gathered and skills developed by Ancient Greek and Roman philosophers. Works of Plato, Aristotle and Cicero have explicitly covered nearness of persuasion and explanation with the use of a word, both spoken and written. It was not until the beginning of the 20th century that argumentation visualization has emerged as an explicit method.

However, some attempts to supplement verbal reasoning communication by ideograms and other visual tools have been undertaken in former times, too. Among those the work of German mathematician and philosopher Gottfried Wilhelm Leibniz (1646 – 1716) memos to be most notable and significant. The work in hand is Characteristics universals: Leibniz had an idea of a universal formal language which could be used to express any scientific concept. In other words, one of Characteristics universalism’s goals was to provide the user nearness of diagrammatic reasoning, a method, in fact, equal to argumentation visualization.

The language’s main method was diagramming. Using words, pictogram’s and interrelation signs, Leibniz showed how different concepts can be clearly represented via diagrammatic reasoning. As an example of such visualization, a diagram, with help of which Leibniz explains Aristotle idea of all material things being formed by different combinations of basic elements, Is approval In 2 Characteristics universalism’s fundamental feature was the use of the alphabet of human thought, a very important element of any effective argumentation visualization tool, as would be seen from further sections of the essay.

Alphabet of human thought, as defined by Leibniz, should serve as a nearness to explain however complicated concepts by decomposing them into a small number of very simple ideas. An example of this kind of basic concepts drawn from the diagram above is shown on Fig. 3. Leibniz has only outlined this universal language, admitting that the work is too hard for him alone to complete, but even after refusing further attempts to create Characteristics universals, he remained excited of the potential of such a communicative tool.

In 1706 he wrote: “ It is true that in the past I planned a new way of calculating suitable for matters which have nothing in common with mathematics, and if this kind of logic were put into practice, every reasoning, even probabilistic ones, would be like that of the mathematician: if need be, the lesser minds which had application and good will could, if not accompany the greatest minds, then at least follow them. For one could always say: let us calculate, and Judge correctly through this, as much as the data and reason can provide us with the nearness for it.

But I do not know if I will ever be in a position to carry out such a project, which requires more than one hand; and it even seems that mankind is still not mature enough to lay claim to the advantages which this method could provide”. (Strickland, 2011) Direct ancestors of argumentation visualization Leibniz did not finish his work, and for several centuries diagrammatic reasoning had no great impulse for development.

Growing complexity of information flows in all spheres of human activities, however, needed new and more efficient ways of presenting information,

including reasoning transmitting, and these needs were satisfied by developments of 20th century scientists. Wiggeries evidence chart In 1913 renowned American Jurist and expert in the law of evidence, dean of the law faculty of Northwestern University, John Henry Wigmaker, has introduced its invention the chart method 0. Goodwin, 2000).

Wiggeries chart was created to help lawyers in the process of analyzing large amounts of legal evidences in trials. By grouping facts and deducing conclusions from evidences' connections lawyers could get a clear representation of all the information relevant to the case. Commenting on evidence chart concept, Wigmaker wrote in 1913: Our object then, specifically, is in essence: To perform the logical (or psychological) process of a conscious Juxtaposition of detailed ideas for the purpose of producing rationally a single final idea.

Hence, to the extent that the mind is unable to Juxtapose consciously a larger number of ideas, each coherent group of detailed constituent ideas must be reduced in consciousness to a single idea; until the mind can consciously Juxtapose them with due attention to each, so as to produce its single final idea. (Wigmaker, 1913) In his charts Wigmaker used lines to express probative processes, and boxes of different shapes in which mummers were placed Ana wanly stood Tort Tact's. I nee menders In can Dos retreat to different evidences, which were specified in the " key list".

Shapes of the boxes indicated type of factual information they contained: testimonial assertions, explanations and refutations, other facts 0. Goodwin, 2000). An example of Wigmaker evidence chart (Fig. 4) and corresponding "

key list” (Fig. 5) are presented below. Author of this essay sees Wiggeries evidence chart as the most significant “ early bird” of today’s argumentation visualization science. It has not only become popular within the Juridical community, but is used at present in an altered form as an argumentation visualization tool.

Dilution’s graphical argument Graphical argument concept, as developed by British philosopher and educator Stephen Toolkit, is another commonly named root of the state-of-the-art methods of argument visualization. The concept was introduced by Toolkit in 1958. Author’s inner debate behind it was, as far as we can allege, the following: driven by the idea of creating a view on logic rooted in the reasoning practice, Toolkit has chosen the usual, everyday argumentation process that is run dozens of times by every human being and decomposed it into main elements. Shun, 2003) These elements included five components and four relationships. The components are: Datum (fact, observation), Warrant (logical step), Claim (consequent assertion), Backing (proof that provided Warrant is reliable), Rebuttal (exceptions to the rule). (Shun, 2003) The relationships are: since, on account of, so, unless. Fig. 6 represents a simple example of Dilution’s graphical argument with all the components and relationships written in italic. Over time other concepts have emerged, but provided milestones seem to provide the reader with sufficient coverage of the topic.

Current state Today’s technological potential, total computerizing and rapidly developing user- oriented software market have resulted in argument visualization transforming into computer-supported argument visualization, or CASSAVA. Different types of CASSAVA are used in education process for

explaining complex concepts and developing co- working skills of the students, in science, in order to provide a universal platform for reasoning and information transmission Oust as Leibniz dreamt of it), in law and management areas – to assist in decision making and, once again, transfer understanding of complex ideas and logical deductions chains.

Depending on the specific function, CASSAVA is further divided into Computer-supported Co-operative Work CSCW), Computer-Mediated Communications (CM) and Computer-supported Collaborative Learning (CLC). Summary of this paragraph is presented in Fig. 7. Market overview Being most often used by budget organizations and enthusiasts, absolute majority of steward ovate to CASSAVA Is Illustrated on a Tree-to-use Oasis.

Another Auteur, rather peculiar and specific to rare areas in the software industry, is broad use of out-of-date software and utilities, developed in 1997-2002. Market’s leader, and at the same time the only shareware-distributed item on the market, is Rationale, based on n elder program Reason! Able. Considerable popularity has also been gained by the following utilities: Belvedere, Convinced, AGAR, Assumes. All utilities provide similar functionality with some bias towards the supposed sphere of application (science, management, law, education).

Challenges and trends Development of special software, which solely consists of CASSAVA tools, is a recent phenomenon, which shows growing need in simple and effective computer-based ways of transmitting reasoning schemes. Another trend easily observable is a growing gap between the two approaches to creating CASSAVA programs. The first approach is to develop

software which provides limited freedom in creating logical frameworks. This limitedness is outbalanced by comprehensive in-program guidance leading to a better understanding of the formal logic and more universal models.

The second approach is to put as little restrictions on the user as possible in order to enable their creativity and broaden argumentative mapping application areas. Several studies have shown contradictory evidences on the positive effects of CASSAVA use: some of them claim that critical thinking and speed of complex concepts reception are affected positively by argumentation visualization tools, others suggest that there is no correlation between critical thinking abilities and CASSAVA methods used in the studying or information transmitting process (Hoffman, 2011).