Oliy ta'lim tizimida zamonaviy texnologiyalardan foydalangan holda ta'lim tizimini takomillashtirish jarayoni

line 1 1st
line 2: *katta o'qituvchi*
(Muhammad al-Xorazmiy nomidagi Toshkent axborot texnologiyalari universiteti)
Coun email address
sarvarsamadovich@gmail.com or
ORCID
https://orcid.org/0000-0002-4725-2251

line 1: 4th Given Name Surname
line 2: *dept. name of organization (of Affiliation)*
line 3: *name of organization (of Affiliation)*
line 4: City, Country
line 5: email address or ORCID
line 1: 3rd Given Name Surname
line 2: *dept. name of organization (of Affiliation)*
line 3: *name of organization (of Affiliation)*
line 4: City, Country
line 5: email address or ORCID

line 1: 6th Given Name Surname
line 2: *dept. name of organization (of Affiliation)*
line 3: *name of organization (of Affiliation)*
line 4: City, Country
line 5: email address or ORCID

This template, modified in MS Word 2007 and saved as a "Word 97-2003 Document" for the PC, provides authors with most of the formatting specifications needed for preparing electronic versions of their papers. All standard paper components have been specified for three reasons: (1) ease of use when formatting individual papers, (2) automatic compliance to electronic requirements that facilitate the concurrent or later production of electronic products, and (3) conformity of style throughout a conference proceedings. Margins, column widths, line spacing, and type styles are built-in; examples of the type styles are provided throughout this document and are identified in italic type, within parentheses, following the example. Some components, such as multi-leveled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

II. Ease of Use

A. Selecting a Template (Heading 2)

First, confirm that you have the correct template for your paper size. This template has been tailored for output on the A4 paper size. If you are using US letter-sized paper, please close this file and download the Microsoft Word, Letter file.

B. Maintaining the Integrity of the Specifications

The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

III. Prepare Your Paper Before Styling

Before you begin to format your paper, first write and save the content as a separate text file. Complete all content and organizational editing before formatting. Please note sections A-D below for more information on proofreading, spelling and grammar.

Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads-the template will do that for you.

A. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

B. Units

· Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive".

· Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity that you use in an equation.

XXX-X-XXXX-XXXX-X/XX/$XX.00 ©20XX IEEE

· Do not mix complete spellings and abbreviations of units: “Wb/m2” or “webers per square meter”, not “webers/m2”. Spell out units when they appear in text: “. . . a few henries”, not “. . . a few H”.

Identify applicable funding agency here. If none, delete this text box.

· Use a zero before decimal points: “0.25”, not “.25”. Use “cm3”, not “cc”. (*bullet list*)

C. Equations

The equations are an exception to the prescribed specifications of this template. You will need to determine whether or not your equation should be typed using either the Times New Roman or the Symbol font (please no other font). To create multileveled equations, it may be necessary to treat the equation as a graphic and insert it into the text after your paper is styled.

Number equations consecutively. Equation numbers, within parentheses, are to position flush right, as in (1), using a right tab stop. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in:

$$a + b = \mathrm{g} \qquad (1)$$

Note that the equation is centered using a center tab stop. Be sure that the symbols in your equation have been defined before or immediately following the equation. Use “(1)”, not “Eq. (1)” or “equation (1)”, except at the beginning of a sentence: “Equation (1) is . . .”

D. Some Common Mistakes

· The word “data” is plural, not singular.

· The subscript for the permeability of vacuum m_0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.

· In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)

· A graph within a graph is an “inset”, not an “insert”. The word alternatively is preferred to the word “alternately” (unless you really mean something that alternates).

· Do not use the word “essentially” to mean “approximately” or “effectively”.

· In your paper title, if the words “that uses” can accurately replace the word “using”, capitalize the “u”; if not, keep using lower-cased.

· Be aware of the different meanings of the homophones “affect” and “effect”, “complement” and “compliment”, “discreet” and “discrete”, “principal” and “principle”.

· Do not confuse “imply” and “infer”.

· The prefix “non” is not a word; it should be joined to the word it modifies, usually without a hyphen.

· There is no period after the “et” in the Latin abbreviation “et al.”.

· The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.

An excellent style manual for science writers is [7].

IV. Using the Template

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

A. Authors and Affiliations

The template is designed for, but not limited to, six authors. A minimum of one author is required for all conference articles. Author names should be listed starting from left to right and then moving down to the next line. This is the author sequence that will be used in future citations and by indexing services. Names should not be listed in columns nor group by affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization).

1) For papers with more than six authors: Add author names horizontally, moving to a third row if needed for more than 8 authors.

2) For papers with less than six authors: To change the default, adjust the template as follows.

a) Selection: Highlight all author and affiliation lines.

b) Change number of columns: Select the Columns icon from the MS Word Standard toolbar and then select the correct number of columns from the selection palette.

c) Deletion: Delete the author and affiliation lines for the extra authors.

B. Identify the Headings

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include Acknowledgments and References and, for these, the correct style to use is "Heading 5". Use "figure caption" for your Figure captions, and "table head" for your table title. Run-in heads, such as "Abstract", will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

Text heads organize the topics on a relational, hierarchical basis. For example, the paper title is the primary text head because all subsequent material relates and elaborates on this one topic. If there are two or more sub-topics, the next level head (uppercase Roman numerals) should be used and, conversely, if there are not at least two sub-topics, then no subheads should be introduced. Styles named "Heading 1", "Heading 2", "Heading 3", and "Heading 4" are prescribed.

C. Figures and Tables

a) Positioning Figures and Tables: Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation "Fig. 1", even at the beginning of a sentence.

TABLE I. Table Type Styles

Table Head	Table Column Head		
	Table column subhead	Subhead	Subhead
copy	More table copy[a]		

[a.] Sample of a Table footnote. (*Table footnote*)

Fig. 1. Example of a figure caption. (*figure caption*)

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization", or "Magnetization, M", not just "M". If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization {A[m(1)]}", not just "A/m". Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)", not "Temperature/K".

Acknowledgment *(Heading 5)*

The preferred spelling of the word "acknowledgment" in America is without an "e" after the "g". Avoid the stilted expression "one of us (R. B. G.) thanks ...". Instead, try "R. B. G. thanks...". Put sponsor acknowledgments in the unnumbered footnote on the first page.

References

The template will number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] was the first ..."

Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

Unless there are six authors or more give all authors' names; do not use "et al.". Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4]. Papers that have been accepted for publication should be cited as "in press" [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

[1] G. Eason, B. NoUDC 519

SEMANTIC REPRESENTATION OF KNOWLEDGE

Rustamov E.N., **Nuraliyev F.M.,*S.A.Tastanova

*Khoja Akhmet Yassawi International Kazakh-Turkish University,

29, Bekzat Sattarhanov Str., Turkistan, 161200 Kazakhstan

** Tashkent University of Information Technologies named after Muhammad al-Khwarizmi, Tashkent, Uzbekistan

***Tashkent University of Information Technologies named after Muhammad al-Khwarizmi

Judo_88@mail.ru, nuraliev2001@mail.ru, tasmaat@mail.ru

Abstract. This paper addresses the issue of knowledge representation in semantic space. A chain of knowledge generation from facts, data, and information is proposed. The concept is introduced that elementary knowledge arises from information interpreted within a given informational context. Moreover, information itself is obtained from data interpreted in the context of domain knowledge. This model of knowledge representation enables the algorithmization of knowledge processing.

Keywords: facts, data, information, knowledge, interpretation, context, semantic knowledge representation.

Introduction. Semantic knowledge representation is a method of structuring information so that its meaning (semantics) is understandable not only to humans but also to machines [1]. The main goal is to represent knowledge in a form that allows computers to "understand" the relationships between concepts and perform logical inference. Based on these considerations, we introduce semantics for the knowledge generation chain.

Fig.1 Semantics of knowledge fractal generation

What is an Information Carrier? When a practical task is considered in an informational space, the information carrier plays a crucial role. In knowledge base (KB) design, the carrier determines the informational dimension (context) in which I^x (x_0) is interpreted [2].

Definition 1. Every fact implies its primary source. Furthermore, each fact must indicate the object it refers to. Let x denote the object referenced in the fact.

Then x X, x δ, where X is the reference set and δ is a subset. We call the object reference the semantic indicator of the fact. Each fact about object x X is represented as a triad:

(p) δ(x) (1)

Definition 2. A set of such expressions p11(x), p22(x), p33(x) is called data about object x X and is written as:

{(p1) 1(x); (p2) 2(x);…} (2)

For simplicity, this can be written as:

{(p1) 1; (p2) 2;…} (x), (3)

that is, to put the general semantic index in parentheses (on the right). If p1= p2=.... , then it is possible to put such reliability out of brackets (on the left)

(p) {1; 2;…} (x)=(p) (x), (4)

where

$\Delta = \{1; 2; \ldots\} =$ (5)

Formula (4) expresses the procedure for interpreting facts in the context of p. The representation of object properties in a database depends on the domain type, reflecting the object properties objectively.

Fig.1 shows the chain of generating domain data.

Fig.1 - Semantics of data formation

It follows from definition 1 that while a single triad $(p)\delta(x)$ expresses local properties, the full set $\{(p1)\ 1; (p2)\ 2; \ldots\}(x)$ expresses global properties of $\delta(x)$. Thus, information and knowledge inherit these properties—an important insight for solving practical tasks.

Definition 3. Information semantics refers to data interpreted within a certain context p_1 relevant to the user's task. There are various definitions of information across fields. In information theory, it measures uncertainty eliminated by a fact. In IT, it's processed data in a certain format. In communication marketing, it's the content of a message. Hence, the application area influences the definition of "information".

Definition 4. The concept of "information about an object" x is defined as such a family of information x about this object, to which belongs, along with each piece of information from this family, all the simplest (obvious) logical consequences. In other words, if x belongs to a family, and every x where <<X, also belongs to a family, and d3(x), where 3=1 2 also belongs to the family. Only in this case may data x , be considered as information. One of the practical algorithms for interpreting (x), is the tabular method.

Definition 5. A non-empty family of elementary facts about a point $x0 \in X$ is called elementary information $I^x(x_0)$ if:

for any $\delta(x_0) \in I^x(x_0)$, $\delta \neq 0$;

it follows from $\delta(x_0) \in I^x(x_0)$ that any more general true reduction of $\delta(x_0)$ belongs to $I^x(x_0)$, i.e. for any superset $\delta \supset \delta$ in X there will be $\delta(x_0) \in I^x(x_0)$;

for any $\delta_1(x_0)$, $\delta_2(x_0) \in I^x(x_0)$, their conjunction also belongs: $(\delta_1(x_0) \& \delta_2(x_0)) \in I^x(x_0)$.

Here, x expresses the interpretation context for $\Delta(x)$ в $x \in X$, and Δ^x is the carrier of $I^x(x_0)$. Elementary information about a point is understood not just as a family of information, but as a family to which information, along with its generalizations, conjunctions, and implications, is interpreted in a given context. The context is set depending on the task being solved.

Data is transformed into information via several mechanisms [3]:

contextualization: purpose of data collection is known;

categorization: units of analysis or key components are identified;

computability: data is mathematically/statistically analyzable;

correction: data is cleaned of errors;

compression: data is aggregated into a concise form.

While computers assist in processing data into information, they lack the ability to define the context. Hence, humans must provide the context based on task-specific domain knowledge [4].

The semantics of information generation is shown in Fig.2

Fig.2 - Semantics of information generation

Now let's define the information carrier.

Definition 6. A carrier of elementary information $I^x(x_0)$ is a subfamily $\Delta^x(x_0) \subset I^x(x_0)$ such that for any $\tilde{\delta}(x_0) \in I^x(x_0)$, there exists a less general fact $\delta(x_0) \in I^x(x_0)$ where $\delta \supset \bar{\delta}$.

If $\Delta^x(x_0)$ is a carrier of $I^x(x_0)$, we say that the information $I^x(x_0)$ is brought by $\Delta^x(x_0)$. In tabular data structures, a row (record) is such a carrier. Thus, $\Delta^x(x_0)$ generates data and information through semantic association.

Theorem 1. Every carrier $\Delta^x(x_0)$ uniquely determines the information $I^x(x_0)$ it conveys at the point x.

Proof let us proceed by contradiction. Suppose there exists another information $I^x(x_0)$, different from $I^{\tilde{}}x(x_0)$, that shares the same carrier $\Delta^x(x_0)$. Consider any elementary datum $\tilde{\delta}(x_0)$ from $\tilde{I}x(x_0)$. By the definition of a carrier, there must exist a less general datum $\delta(x_0)$ from $\Delta^x(x_0)$, such that $\delta \supset \bar{\delta}$. However, since $\Delta^x(x_0)$ is a carrier for $\tilde{I}x(x_0)$ in the space x, the datum $\delta(x_0)$ must also belong to $I^x(x_0)$. According to the definition of elementary information, any more general datum, including $\tilde{\delta}(x_0)$, must also belong to $I^x(x_0)$. This implies that $\tilde{I}x(x_0) \subseteq I^x(x_0)$. Similarly, one can prove that $I^x(x_0) \subseteq \tilde{I}x(x_0)$. Hence, $I^x(x_0) = \tilde{I}x(x_0)$.

When a practical problem is considered within an informational space, the information carrier plays a critical role. This is because, during the design of a knowledge base, it is precisely the carrier that determines the informational dimension (context) in which $I^x(x_0)$ is interpreted.

It should be noted that the notion of semantic information, or knowledge semantics, is absent in traditional (wienerian) cybernetics. This absence arises from the fact that, in cybernetics, each point $x \in X$, when considered within an informational space, may be characterized by a large number of interrelated heterogeneous properties. As a result, defining knowledge about such a point requires a deeper (in a dialectical sense) investigation of its properties and identification of its semantic indicator.

Definition 7. A non-empty family of elementary information $I^x(x_0)$ about a point $x_0 \in X$ is called elementary knowledge about the point x_0 in X with respect to a given informational unit (иej), and is denoted by $\Phi ue(I^x(x_0)$, if the following conditions are satisfied:

- $I^x(x_0)$ is a non-empty subset: $I^x(x_0) \neq \emptyset$. In this case, $(\Phi^{ue}(I^x x_0))$ is referred to as global knowledge;

- from $I^x(x_0) \in \Phi^{ue}(I^x(x_0))$, it follows that any more general information $I^x(x_0)$ also belongs to $\Phi^{ue}(I^x(x_0))$. That is, for any superset $I^x(x_0)$ $I^x(x_0)$ in X, we have $I^x(x_0) \in \Phi^{ue}(I^x(x_0))$;

- if $I_1^x(x_0), I_2^x(x_0) \in \Phi^{ue}(I^x(x_0))$, then their conjunction $I_1^x(x_0) \wedge I_2^x(x_0) \in \Phi^{ue}(I^x(x_0))$, where «$\wedge$» denotes logical conjunction. Moreover, $[\![ue]\!]_j \supset p$. In this case, the conjunction $I_1^x(x_0) \wedge I_2^x(x_0) = \Delta^{ue}(x_0)$ serves as the carrier of knowledge $\Phi^{ue}(I^x(x_0)$.

Theorem 2. Any finite $(p)\Delta([\![ue]\!]_i)$ information $I^{([\![ue]\!]_i)}(x)$, is equivalent to elementary knowledge $\Phi^{([\![ue]\!]_i)}\Delta(x))$ if $\delta \subset [\![ue]\!]_i$.

Proof. Let $\Delta(x) = \{\delta_1(x); \ldots; \delta_n(x)\}$ in the context of uej. Then their conjunction $\delta(x) = \delta_1(x) \& \ldots \& \delta_n(x)$ also belongs to $I^{([\![ue]\!]_i)}(x)$. By definition of $I^{ue}(x)$, there exists $\delta_1(x)$ from $\Delta(x)$ that is less general than $\delta_0(x)$, i.e. $\delta_i \subset \delta_0$.

Thus, among the data in $\Delta(x)$, there exists a datum $\delta_i(x) = \delta_0(x)$, while the other data are more general than $\delta_0(x_0)$. Therefore, $\Delta(x)$ and $\delta_0(x)$ provide the same information $I^{([\![ue]\!]_i)}(x)$ as $\tilde{I}^{ue}(x)$, implying that $\delta \subset [\![ue]\!]_i$. Consequently, $I^{([\![ue]\!]_i)}(x)$ constitutes elementary knowledge.

Theorem 3. If the knowledge $\Phi^{([\![ue]\!]_j)}$ has a unique carrier $\Delta^{\prime}(x)$ in ue_j, then this carrier is uniquely defined.

Proof. We proceed by contradiction. Suppose there exist two identical carriers $\Delta_1^{\prime}(x)$ and $\Delta_2^{\prime}(x)$ for the knowledge $\Phi^{([\![ue]\!]_i)}(x)$. Since $\Delta_2^{\prime}(x)$ is a carrier of $\Phi^{([\![ue]\!]_i)}$, it must belong to $\Phi^{([\![ue]\!]_i)}(\Delta(x)$. According to the definition of a carrier $\Delta_1^{\prime}(x)$, for any information $\tilde{\delta}(x)$ from $\Delta^{\prime}(x)$, there exists less general information from the carrier, i.e., $(p)(\delta \subset \tilde{\delta})$ in uej.

A symmetric argument yields the reverse inclusion $(p)(\delta \subset \tilde{\delta})$, which leads to $\delta = \tilde{(\delta_1)}$.

Finally, knowledge is the result of cognitive activity—a system of concepts about reality acquired through this activity. This, in general terms, constitutes the semantics of knowledge. Thus, the semantics of knowledge generation is illustrated in fig.3.

Fig.3 - Semantics of knowledge generation

Conclusions. The perceived data fixed within some context of the surrounding world represent raw data. When used in solving specific tasks, these data become information. The perception of such information within an appropriate informational unit is associated in our mind as knowledge.

With the development of intelligent systems, the task of formalizing the algorithmic chain of knowledge generation—that is, the transformation from “data” to “information” and most critically, from “information” to “knowledge”—becomes increasingly relevant. Without formalizing and algorithm zing these procedures, it is impossible to design effective AI systems.

To summarize this chapter: solving this task is only possible by formalizing the semantics of these concepts, as they constitute the theoretical foundation of informatics.

References

Rustamov N.T., Temirbekov A.N., Anarbaev Zh.O. Semantic Representation of Knowledge. Bulletin of IKTU named after A. Yasawi, No. 1, 2012, pp. 37–44.

Mukhamediyeva D.T., Rustamov E.N. Algorithmic Aspects of Designing Intelligent Information Systems. VII International Scientific and Practical Conference “The Role of Innovative Technologies in the New World,” Part I / Almaty, 2022, pp. 3–13.

Muhamediyeva D.T., Rustamov E.N. Semantic Representation of Production Knowledge. 2022 International Conference on Information Science and Communications Technologies (ICSCT), IEEE Conference Proceedings, Tashkent, pp. 1–4.

Mukhamediyeva D.T., Rustamov E.N. Knowledge Processing Algorithm. Problems of Computational and Applied Mathematics. – 2023. – No. 1(46). – pp. 88–100.

Rustamov N., Amirtayev K. A heuristic model for evaluating the mental qualities of a leader. Problems of Computational and Applied Mathematics, 2(64):46–53, 2025. https://doi.org/10.71310/pcam.2_64.2025.04

Rustamov N.T., Amirtayev K.B. Computer Simulation of Human Psychological Symbiosis. Bulletin of the International Kazakh-Turkish University named after Khoja Akhmet Yassawi (Mathematics, Physics, Informatics Series), No. 1 (32), 2025. https://doi.org/10.47526/3007-8598-2025.1-15

Rustamov N.T., Rustamov Y.K. Infological Model of TERRORISM against the Background of Social Stratification (Modeling Terrorism). LAP LAMBERT Academic Publishing, Germany, 2014, 122 p. ISBN 978-658-18551-9

Rustamov N.T., Israilov R.I., Rustamov B.K. On the Issue of Designing a Knowledge Base (Using Stroke as an Example). Tashkent: “Innovatsion rivozhlanish nashriyot-matbaa uyi”, 2020. 112 p. ISBN 978–9943–6492–7–9

Alonso, H.M., Plank, B. (2017). When is multitask learning effective? Semantic sequence prediction under varying data conditions. In: EACL, Vol. 1, pp. 44–53.

Liu, P., Qiu, X., Huang, X. (2016). Recurrent Neural Network for Text Classification with Multi-Task Learning. In: Proceedings of the 25th International Joint Conference on Artificial Intelligence (IJCAI-16), pp. 2873–2879.

Angus McCoss. Yin Yang Cosmology. Journal of Modern Physics, Vol. 14, No. 7, June 30, 2023. DOI: 10.4236/jmp.2023.147061

Kan Wu, Laner Wu, Zhenkun Huang, Yong Jiang, Yun Ma. Journal of Materials Science and Chemical Engineering, Vol. 3, No. 7, July 1, 2015. DOI: 10.4236/msce.2015.37011

Lan, Z., Chen, M., Goodman, S., Gimpel, K., Sharma, P., & Soricut, R. (2020). ALBERT: A Lite BERT for Self-Supervised Learning of Language Representations. arXiv preprint arXiv:1909.11942

Rustamov N.T., Temirbekov A.N., Rustamov B.K., Anarbaev Zh.O. Semantic Model of Energy-Informational Medicine. Bulletin of IKTU named after H.A. Yassawi, No. 3, 2008, pp. 121–131.

Israilov R.I., Rustamov N.T., Rustamov B.K. Mathematical Method for Clinical Prediction of Morphological and Morphometric Changes in Cerebral Vessels During Stroke. Mathematical Morphology. Electronic Journal of Mathematical and Biomedical Research, Vol. 8, No. 1, 2009, pp. 7–15.

Rustamov N.T., Temirbekov A.N., Kantureeva M.A., Asilbayeva A.P. Evaluation of Knowledge Semantics. Bulletin of KarGU, No. 2(54)/2009, Mathematics Series, pp. 52–56.

Muhamediyeva D.T., Rustamov E.N. Semantic Representation of Production Knowledge. 2022 International Conference on Information Science and Communications Technologies (ICISCT). https://doi.org/10.1109/ICISCT55600.2022.10146951

Whitney L. Heppner, Michael H. Kernis, John B. Nezlek, Joshua Foster, Chad E. Lakey, Brian M. Goldman. Within-Person Relationships Among Daily Self-Esteem, Need Satisfaction, and Authenticity. Psychological Science. 19(11):1140-5. 2008. DOI:10.1111/j.1467-9280.2008.02215.x

Philippe Rochat . Five levels of self-awareness as they unfold early in life. Consciousness and Cognition. 12 (2003), pp 717–731. https://doi.org/10.1016/S1053-8100(03)00081-3

ble, and I. N. Sneddon, “On certain integrals of Lipschitz-Hankel type involving products of Bessel functions,” Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. *(references)*

[2] J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.

[3] I. S. Jacobs and C. P. Bean, “Fine particles, thin films and exchange anisotropy,” in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.

[4] K. Elissa, “Title of paper if known,” unpublished.

[5] R. Nicole, “Title of paper with only first word capitalized,” J. Name Stand. Abbrev., in press.

[6] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].

[7] M. Young, The Technical Writer’s Handbook. Mill Valley, CA: University Science, 1989.