Method of Determining Significant Linguistic Bipolar Features on the Basis of Submitting Phonetic Assessments of Sound-Letters

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Abstract. An information model for the analysis of textual information resources (TIR) was built on the basis of the formation of a semantic differential (the formation of phonetic ratings with reference to the bipolar scale of linguistic features). A method has been developed for highlighting significant linguistic bipolar features based on the presentation of phonetic estimates of the sound letters of the alphabet in a real non-equilibrium positional space.

Keywords: semantic differential, suggestive influence.

1 Introduction

Identification of suggestive informational destruction in text information resources (TIR) is provided on the basis of their corresponding analysis. Moreover, such an analysis must be carried out taking into account the laws of the sound effect of TIR on the subconscious of the personality. In this direction, the key approach is the method of semantic differential.

The semantic differential is a technology for the analysis of text structural units (elements) S based on the establishment of quantitative estimates (phonetic values) from the totality Θ of characteristic linguistic bipolar signs (the area of the attribute aspect), formed on the basis of pairs of antonyms [1-5].

Depending on the level of integration, textual structural units (elements) are considered at three levels, namely:

— single word level S_{word} (first-order text structural component);
— text fragment level S_{frg} (second-order text component);

level of whole text documents S_{doc} (third-order textual structural component - textual information resource (TIR). Quantity Q_θ such linguistic bipolar features are selected by expert means taking into account adaptation with respect to the subject area. Accordingly, cooperation Θ such LB features, $\Theta = \{\theta_i\}$, $i=\overline{1,Q_\theta}$, taking into account the subject area characterizes the space Ω subconscious sense of personality. Quantity Q_θ such linguistic bipolar (LB) features are selected expertly, taking into account adaptation of the subject area. Accordingly, the totality Θ such LB features, $\Theta = \{\theta_i\}$, $i=\overline{1,Q_\theta}$, taking into account the subject area characterizes the space Ω subconscious sense of personality [6-9].

Bipolarity θ_i means having a pair of antonyms, i.e.. $\theta_i = \{\alpha_i; \overline{\alpha_i}\}$, $i=\overline{1,Q_\theta}$. Accordingly, two poles - antonyms of characteristic linguistic features are formed, namely α_i - positive pole of i -nd linguistic feature from the point of view of perception of sounds to the subconscious personality. Accordingly $\overline{\alpha_i}$ - negative pole i -nd linguistic feature, formed as an antonym of a relatively positive pole α_i.
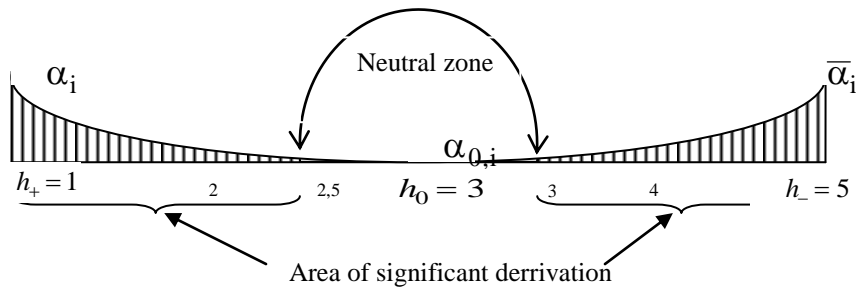
Fig. 1. The structural scheme of linguistic bipolar feature

At the center of the scale of this feature is zero (neutral) $\alpha_{0,i}$, around which a neutral zone is formed. The neutral zone is used to determine the insignificance of the effect of the chosen feature on the sub-sustion of the person (teenager) taking into account the specifics of the chosen subject area. In order to detect the hidden information and psychological impact in the structural components of the TIR, It is proposed to use the technology of the se-mantic differential. In this case, the structural component of TIR is presented in the phonetic space (the space of acceptance of sounds at the subconscious level of the individual) taking into account the binding to the bipolar (bipolar) scale of linguistic features, i.e. taking into account the positioning relative to negative and positive poles. The phonetic description of the structural component of TIR represents the semantics of their sound perception, not at the conscious level, but at the subconscious level of the individual. The differential is determined by the presence of a binding to a bipolar scale of linguistic features [10-12].

Method of Highlighting Significant Linguistic Bipolar Features Based on the Presentation of Phonetic Assessments of Sound Letters

To obtain the phonetic meanings $f_{i,\tau}$ of the letters S_τ (s_τ is τ the letter of the alphabet) of text information resources according to the linguistic bipolar (LB) characteristics, it is necessary to formulate their description in the form of sound letters b_τ (b_τ - the sound letter). This is because the letters themselves do not take into account all the psychologically important features of the sounds when writing. A single letter cannot directly reflect a soft and hard consonant. On the contrary, sound letters take into account the peculiarities of pronunciation. In this case, the pronunciation of the two letters (the current and the following one) is ensured. Accordingly, variations in the sound of all kinds of two-letter combinations form the alphabet of sound letters. The power of such an alphabet is denoted by Q_b [13-16].

Each sound-letter b_τ you need to quantify $f_{i,\tau}$ in accordance with the selected scales of linguistic bipolar recognition. This allows you to identify the level of influence of each sound-letter in the space of sound sensations of the personality. In this case, each sound-letter of the alphabet is detected Q_θ characteristic birolar features. Such detection is carried out in an expert way. In this case, expert assessments are made $f_{i,\tau}$ taking into account the perception of each sound-letter by gradations of the scales of bipolar characteristic space. This is set by this ratio:

$$, \quad \tau=\overline{1,Q_b}, \quad i=\overline{1,Q_\theta} .) \tag{1}$$

where φ_{sd} is the functionality of quantifying each sound-letter to the bipolar feature; $f_{i,\tau}$ - phonetic value τ -nd sound-letter by i -nd bipolar feature.

The physical meaning of phonetic value. Value $f_{i,\tau}$ places τ -nd sound-letter on the scale i -nd bipolar feature.

Value $f_{i,\tau}$ quantitatively reflects the level of positioning of the sound-letter is fundamentally positive and negative its sensation on the subconscious level of the personality (teenager). So the value $f_{i,\tau}$ quantitatively sets the level and direction of the PI influence τ -nd sound-letter on the subconscious of a teenager by i -nd bipolar feature [17-21].

The whole process can be called as identification of sound letters in the prism-carpet space of the sound sensations of the person on its subconscious level (in the space of sound influence on the subconscious of the teenager). This identification is carried out by positioning sound letters on the scales of bipolar features.

As a result of identification of all sound letters in the attribute space of their sound influence on the subconscious, a two-dimensional matrix is formed F_{sd} , i.e.

$$F_{sd} = \begin{vmatrix} f_{1,1} & \cdots & f_{1,\tau} & \cdots & f_{1,Q_b} \\ & & \cdots & & \\ f_{i,1} & \cdots & f_{i,\tau} & \cdots & f_{i,Q_b} \\ & & \cdots & & \\ f_{Q\theta,1} & \cdots & f_{Q\theta,\tau} & \cdots & f_{Q\theta,Q_b} \end{vmatrix} \qquad (2)$$

The value $f_{i,\tau}$ takes on value from the field $f_{i,\tau} \in [h_+ ; h_-]$.

Here, h_- is the upper limit for quantifying the degree of proximity of the i-th sound-letterrelative to the negative pole $\overline{\alpha}_i$ of the attribute θ_i; h_+ - the upper limit for the quantitative assessment of the degree of proximity of the i-th sound-letter with respect to the positive pole α_i of the attribute a θ_i) [22].

To quantify the degree of significance of a bipolar sign θ_i it is proposed to use an information approach(IP).Then, the greater the degree $V(F_i)$ of uncertainty (informativity of a sign), the higher its significance for determining the level of influence of sound letters on a person's subconscious through sound perception. In this case, uncertainty is of interest without taking into account the sign of the influence of sound letters on the human subconscious (positive or destructive). Therefore, to conduct such an assessment, it is proposed to use values $_\Delta f_{i,\tau}$, equal to the absolute values of the deviations of the corresponding phonetic values $f_{i,\tau}$ relative to the zero level of the gradation scale of bipolar signs θ_i namely [23-25]:

$$_\Delta f_{i,\tau} = |h_0 - f_{i,\tau}| \qquad (3)$$

In this case, for the nth bipolar feature, a sequence of samples (phonetic values) is formed, i.e.:

$$_\Delta F_i = \{ _\Delta f_{i,1}, \ldots, _\Delta f_{i,\tau}, \ldots, _\Delta f_{i,Q_b} \} \qquad (4)$$

whose length is Q_b. Vector F_i determines the significance of i-nd bipolar feature by the totality of sound letters to assess the impact on the subconscious of a person (teenager) through his sound sensations. The higher the number of values $f_{i,\tau}$, whose values are approaching extreme boundaries h_- and h_+ poles of the sign θ_i, the higher the importance of the chosen bipolar feature to assess the sound effect on the subconscious personality. It is obvious that the positioning of the $f_{i,\tau}$ near the neutral zone i-nd bipolar feature indicates its insignificance in determining the level of sound influence on the subconscious of the person for this subject matter [26].

To quantify the significance of bipolar feature θ_i it is **proposed** to use an informational approach. Then the greater the degree $V(F_i)$ uncertainty (informativeness of the feature), the higher its importance for determining the level of influence of sound

letters on the subconscious of the person through sound perception. In this case, it is interested in uncertainty without taking into account the effect of sound letters on the subconscious of the person (positive or destructive). Therefore, it is proposed to use the value of the $_\Delta f_{i,\tau}$, equal absolute deviations of relevant phonetic values $f_{i,\tau}$ relatively zero h_0 gradation scale of bipolar feature θ_i , namely [27-29]:

$$_\Delta f_{i,\tau} = |h_0 - f_{i,\tau}| \tag{5}$$

Each such report $_\Delta f_{i,\tau}$ is generally a real number, and will be bounded above by an integer value $_\Delta f_{i,\max}$, which is given by the following inequality:

$$0 \le {}_\Delta f_{i,\tau} < {}_\Delta f_{i,\max} \tag{6}$$

In this ratio, the value $_\Delta f_{i,\max}$ is determined by the formula:

$$_\Delta f_{i,\max} = ((\max_{1 \le \tau \le Q_b} {}_\Delta f_{i,\tau} - \min_{1 \le \tau \le Q_b} {}_\Delta f_{i,\tau})/\delta_i) + 1 \tag{7}$$

where δ_i is the sampling interval of the quantities for the sequence $_\Delta F_i$.

Therefore, it is proposed to consider the sequence $_\Delta F_i$ as a number in a real nonequilibrium attribute space Ω . Where the quantity $V(F_i)$ of information (the degree of information content of the attribute θ_i) will be determined as:

$$V(F_i) = [\ell og_2 \prod_{\tau=1}^{Q_b} ((\max_{1 \le \tau \le Q_b} {}_\Delta f_{i,\tau} - \min_{1 \le \tau \le Q_b} {}_\Delta f_{i,\tau})/\delta_i) + 1)] + 1 \tag{8}$$

The larger the value $V(F_i)$, the higher the information content of the bipolar sign θ_i . And, conversely, a decrease in the value $(_\Delta f_{i,\tau} + 1)$ corresponds to a decrease in the degree of uncertainty in the distribution of values $_\Delta f_{i,\tau}$ for the corresponding attribute.

Definition of values $V(F_i)$ for all signs of space Ω , i.e. $i = \overline{1, Q_\theta}$ allows you to highlight the most significant bipolar signs for assessing the degree of IP influence of sound letters on the human subconscious through his sound perception. Cutting off of insignificant signs is carried out using a threshold value $V(F)_h$. Then if inequality is satisfied:

$$V(F_i) < V(F)_h , \tag{9}$$

On the contrary, for the condition $V(F_i) \ge V(F)_h$ he bipolar sign will be significant,, i.e. $\theta_i \to \theta(h)_i$. The sequence of significant features will be denoted as $\Theta(h)_i = \{\theta(h)_1,...,\theta(h)_i,...,\theta(h)_{Q_h}\}$. As a result of such selection, further pro-

cessing of text information resources (TIR) will be carried out using information only for significant bipolar signs $\theta(h)_i$.

Consider the assessment (identification) of the significance of the sound-letter by the conscience of all LP signs on the subconscious personality (teenager) through its sound sensations.

Accordingly, consider the slice (sound-letter identifier vector) for each column F_τ, i.e.:

$$F_\tau = \{ f_{1,\tau}, ..., f_{i,\tau}, ..., f_{Q_h,\tau} \} \tag{10}$$

where $f_{i,\tau}$ is phonetic value τ-nd sound-letters on i-nd bipolar sign.

Such cut F_τ allows to identify τ-nd sound-letter in the sign space of sound sensations (sound influence) on the subconscious personality.

The greater the number of quantities $f_{i,\tau}$, Whose values are approaching extreme limits h_- and h_+ poles of signs θ_i, the higher the importance of sound influence τ-nd sound-letters on the subconscious personality respectively on the negative or positive side.

For identification, it was important not only to establish the degree of importance (informativity) of the sound-letter from the position of influencing the subconscious of a person through his perception, but also to establish the sign of such influence, namely, positive (constructive) or negative (destructive).

Determination of level of informational content τ-nd sound-letter encouraged to implement, taking into account information about the deviations $_\Delta f_{i,\tau}$ values $f_{i,\tau}$ relative to zero level h_0 gradation scale of bipolar feature $\theta(h)_i$. It is proposed to carry out sign influence of sound-letter by means of separate processing of values $_\Delta f_{i,\tau}$, whose values of sizes $f_{i,\tau}$ located respectively in ranges $[h_+ ; h_0 - 1]$ and $[h_0 ; h_-]$. If size $f_{i,\tau}$ Deviations fall within the interval $[h_+ ; h_0 - 1]$, т.е.:

$$_\Delta f_{i,\tau} = {}_\Delta f_{i,\tau}^{(+)} \text{ для } h_+ \leq f_{i,\tau} \leq h_0 - 1, \tag{11}$$

then it has a positive influence focus.

On the contrary, if inequality is fulfilled $h_0 \leq f_{i,\tau} \leq h_-$,

$$_\Delta f_{i,\tau} = {}_\Delta f_{i,\tau}^{(-)} \text{ для } h_0 \leq f_{i,\tau} \leq h_-, \tag{12}$$

then deviation size $_\Delta f_{i,\tau}$ will be taken into account in the process of assessing the level of destructive impact on the subconscious through human sound sensations.

Generically, such a distribution of phonetic deviations $_\Delta f_{i,\tau}$ by i-nd feature can be represented by the following expression system:

$$_\Delta f_{i,\tau} = \begin{cases} {}_\Delta f_{i,\tau}^{(+)}, \rightarrow h_+ \leq f_{i,\tau} \leq h_0 - 1; \\ {}_\Delta f_{i,\tau}^{(-)}, \rightarrow h_0 \leq f_{i,\tau} \leq h_-. \end{cases} \tag{13}$$

From here we get two deviation vectors $F_\tau^{(+)}$ and $F_\tau^{(-)}$, Containing information on phonetic values of sound letters, namely:

$$F_\tau^{(+)} = \{ \,_\Delta f_{1,\tau}^{(+)}, ..., \,_\Delta f_{i,\tau}^{(+)}, ..., \,_\Delta f_{Q_h^{(+)},\tau}^{(+)} \} \qquad (14)$$

$$F_\tau^{(-)} = \{ \,_\Delta f_{1,\tau}^{(-)}, ..., \,_\Delta f_{i,\tau}^{(-)}, ..., \,_\Delta f_{Q_h^{(-)},\tau}^{(-)} \} \qquad (15)$$

Which are characterized, respectively, by the positive and negative direction of influence on the subconscious personality. Here $Q_h^{(+)}$ and $Q_h^{(-)}$ - quantity of deviations of phonetic values having respectively positive and negative direction of sound influence on personality (adolescent) sub-consciousness.

Sequenses $F_\tau^{(+)}$ and $F_\tau^{(-)}$ similarly interpreted as numbers in a nonequilibrium positional real space with the directional deviations from zero levels of gradation scales bipolar linguistic features. Then the corresponding integrated quantity $V(F_\tau^{(+)}; Q_h^{(+)})$ и $V(F_\tau^{(-)}; Q_h^{(-)})$ information (the degree of information content of the sound-letter by the level of its influence on the subconscious of the teenager) by all significant signs of space Ω_h will be determined by such formulas:

$$V(F_\tau^{(\phi)}; Q_h^{(\phi)}) = [\ell og_2 \prod_{i=1}^{Q_h^{(\phi)}} ((\max_{1 \le i \le Q_h^{(\phi)}} \,_\Delta f_{i,\tau}^{(\phi)} - \min_{1 \le i \le Q_h^{(\phi)}} \,_\Delta f_{i,\tau}^{(\phi)}) / \delta_\tau^{(\phi)}) + 1)] + 1 \qquad (16)$$

where $\delta_\tau^{(+)}$ и $\delta_\tau^{(-)}$ is step of sampling of values $\,_\Delta f_{i,\tau}^{(-)}$ and $\,_\Delta f_{i,\tau}^{(-)}$ correspondingly for sequences $F_\tau^{(+)}$ and $F_\tau^{(-)}$; ϕ - sign of the direction of the influence, ϕ="+" and ϕ="−".

To obtained the following condition formulas:

$$\,_\Delta f_{i,\tau}^{(\phi)} < (\max_{1 \le i \le Q_h^{(\phi)}} \,_\Delta f_{i,\tau}^{(\phi)} - \min_{1 \le i \le Q_h^{(\phi)}} \,_\Delta f_{i,\tau}^{(\phi)}) / \delta_\tau^{(\phi)}) + 1 \qquad (17)$$

The larger the values $V(F_\tau^{(+)}; Q_h^{(+)})$ and $V(F_\tau^{(-)}; Q_h^{(-)})$, the higher the informativeness of τ -nd sound-letter in the direction of positive and positive influence, respectively. Such estimates allow you to use information on the phonetic deviations for all significant characteristics of space at the same time Ω_h:

— first to estimate the importance of influence of sound-letters on subconsciousness of the person through his sound feelings taking into account at the same time all information on significant features space Ω_h;

— secondly to establish orientation of such influence.

To identify the most significant sound-letters by the level of their influence on the subconscious of the individual, threshold levels are introduced, namely: $V(F^{(+)})_h$

and $V(F^{(-)})_h$. For known thresholds, sound-letter selection by significance is performed using the following inequalities::

$$V(F_\tau^{(+)}; Q_h^{(+)}) > V(F^{(+)})_h; \quad V(F_\tau^{(-)}; Q_h^{(-)}) > V(F^{(-)})_h \tag{18}$$

If inequalities are met, then τ-nd sound-letter is significant $b(\ell;t;h)_{u,\tau}$ by the level of its influence on the subconscious of a person, respectively, in a negative or negative direction.

Establishing the significance of the direction of influence of the sound-letter on the sub-knowledge of the person taking into account the whole feature of space is organized by comparing the values $V(F_\tau^{(+)}; Q_h^{(+)})$ and $V(F_\tau^{(-)}; Q_h^{(-)})$. Then if the follow inequality is fulfilled:

$$V(F_\tau^{(+)}; Q_h^{(+)}) < V(F_\tau^{(-)}; Q_h^{(-)}), \tag{19}$$

then τ-nd sound-letter integrated has destructive effect on human subconscious through its sound perception.

If the following ratio is met:

$$V(F_\tau^{(+)}; Q_h^{(+)}) \approx V(F_\tau^{(-)}; Q_h^{(-)}) \tag{20}$$

Decision is made on insufficient information to establish direction of influence of a particular sound-letter. In this case, other sound-letters in the word are evaluated and/or another method of assessing the subliminal effect on the subconscious personality is used.

Conclusions

The information model of TIR analysis was built (for the first time) on the basis of the formation of a semantic differential (the formation of phonetic assessments with reference to the bipolar scale of linguistic features). On the basis of what, a method was developed for distinguishing significant linguistic bipolar characters based on the presentation of phonetic estimates of the sound letters of the alphabet in a real non-equilibrium positional space. The main difference here is that the vector phonetic space of a linguistic bipolar feature is represented in all sound letters in a bipolar material non-equilibrium positional basis. This allows using only significant linguistic bipolar (LB) signs in the TIR analysis process, which ultimately reduces the time delay for TIR processing. Developed method of determining significance of hidden phonetic effect of sound-letter on personality subconscious by all LB signs. The main difference lies in identification of the significance level of sound-letter influence on personality subconscious in vector phonetic space of LB features with construction of real non-equilibrium basis. This allows you to create lookup tables to further improve the speed of processing information resources that are products of real-time services.

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