Processing of the Uzbek Language by Technology the Multilanguage Modeled Computer Interpreter

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ABSTRACT: Problem of any machine translation system is, "decoding" of sense of the entrance text in a natural language and its representation in the formalized kind clear to system of the interpreter. Further the system should translate and inform this text the target text for the user in semantic conformity with the entrance text. It is possible to reach, thanks to formalization of grammar of various natural languages and revealing of designs of the languages supposing modeling.

In the given work the new developed logic-linguistic models of words and offers on types of the Uzbek language, for automatic system of the multi language machine interpreter «Tarjimon-LMX» are resulted. System "Tarjimon-LMX" is developed as multilingual on the basis of technology of the multi language modeled computer interpreter. Logic-linguistic models are described by means of the expanded source language developed according to technology of the multi language modeled computer interpreter.

KEYWORDS: Logic-linguistic model of words, A noun, An adjective, A verb, A pronoun, An adverb, The numeral, Logic-linguistic model of offers, Uzbek language, Te expanded source language, The machine translation system.

I. INTRODUCTION

Each natural language (NL) is the difficult system, consisting the mathematical not structured and not as not formalized components. However the carried out researches over NL show, what not structure and not formalization NL, it is possible to lead structured, and to the formalized kind using linear methodology – revealing of structure of a word, construction of logic-linguistic models on types of words and offers, and further construction of mathematical models by means of the special source language. The given methodology can be defined as degree of formalization of language. Formalization degree in turn defines degree of formalization of semantics NL and accuracy of algorithm. The superficial understanding of degree of formalization NL, that the formalized language – abstract, the design completely torn off from the maintenance with simple logic structure leads to low technology of machine translation [2]. Formalization allows to allocate its various parts and to investigate dynamics of their communications, and mainly the description of its semantic structure.

Functionality of word NL is shown in its polysemy. In concrete cases the concrete value gets each word in a phrase and-or in the offer. The recognition of functionality of a word leads to semantic unambiguity, except for some concrete cases followed from NL. It leads to two essentially various approaches at construction of logic-linguistic models NL – or to develop uniform system of linear processing of words and offers, or to consider each word and the offer as individual structure according to which it is processed. In our case the first approach which performance provides transfer from language **A** in language **B,** belonging to the class 0 on N. Chomshy classification [1] is used. In a multilingual situation of machine translation if the mathematical model is distinguishing, it characterises language **A,** differently as generating characterises language **B.**

The technology of the multi language modeled computer interpreter including above stated concept, consists of several stages of carried out works, such as research of natural languages on the given technology, creation of the expanded source language (meta language), working out of semantic databases NL, working out of multi language bases of terms and phrases on subject domains, modeling NL, algorithmization and working out of program circle of the interpreter [4].

In the present work logic-linguistic models of the Uzbek language (UL) forming words and offers on types are stated.

II. THE GENERAL LOGIC-LINGUISTIC MODEL OF FORMATION OF A WORD

Lexical analysis UL shows, that words share on four types making – a root, affixes forming words, affixes forming the form and affixes changing words. According to it, it is possible to construct the general logic-linguistic model of formation of word UL using signs on the expanded source language for mathematical modeling NL [4]:

root $\oplus \Downarrow$ affixes forming words $\oplus \Downarrow$ affixes forming the form $\oplus \Downarrow$ changing words

Hereinafter, signs mean: - $\oplus$ joining operation, $\Downarrow$ - operation of possible "connection" or "not connections" a component following it [4].

III. LOGIC-LINGUISTIC MODELS OF WORDS ON TYPES

Logic-linguistic models of a conclusion *of nouns* UL by *affixation rules* has seven types:

1) a noun $\oplus \Downarrow$ an affix $\oplus \Downarrow$ a suffix of plural forming a word $\oplus \Downarrow \oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

2) $\Downarrow$ an affix forming a word $\oplus$ a noun $\oplus \Downarrow$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

3) a verb $\oplus$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

4) an adjective $\oplus$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

5) the numeral $\oplus$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

6) a pronoun $\oplus$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

7) an adverb $\oplus$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow \oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

Logic-linguistic models of a conclusion *of nouns* UL by *composition rules* has six types:

1) a noun $\oplus$ a noun $\oplus \Downarrow$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

2) an adjective $\oplus$ a noun $\oplus \Downarrow$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

3) the numeral $\oplus$ a noun $\oplus \Downarrow$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

4) a noun $\oplus$ a verb $\oplus \Downarrow$ an affix forming a word $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

5) a verbal adverb $\oplus$ a participle $\oplus \Downarrow$ a word designating actions $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects - $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

6) a noun $\oplus$ a participle $\oplus \Downarrow$ a word designating actions $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

At construction *of adjectives* by *rules of affixation* the noun, an adjective**,** a verb, an adverb can be roots of words. Logic-linguistic models of a conclusion of adjectives UL by affixation rules has seven types:

1) a noun $\oplus$ an affix forming a word $\oplus \Downarrow$ diminutive degree of an adjective $\oplus \Downarrow$ a suffix of plural $\oplus \Downarrow$ a suffix of subjects $\oplus \Downarrow$ a suffix of a case $\oplus \Downarrow$ a particle

2) a noun ⊕ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

3) an adjective ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

4) magnifying degree of an adjective ⊕ an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

5) a verb ⊕ an affix forming a word ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

6) an adverb ⊕ an affix forming a word ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

7) an affix-pretext for a noun ⊕ a noun ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

Logic-linguistic models of a conclusion *of adjectives* UL by *composition rules* has eight types:

1) an adjective ⊕ an adjective ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

2) an adjective ⊕ a noun ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

3) a noun ⊕ a noun ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

4) an adverb ⊕ a noun ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

5) an adverb ⊕ an adjective ⊕ ⇓ diminutive degree of an adjective ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

6) an adjective ⊕ a noun ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of subjects ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle

7) a noun ⊕ an affix «аро» ⊕ ⇓ a particle

8) an affix «умум» ⊕ a noun ⊕ ⇓ a particle

Logic-linguistic models of a conclusion *of verb* UL by *affixation rules* has seven types:

1) a verb ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a particle specifying in time of a verb ⊕ ⇓ a particle of the person ⊕ ⇓ a particle

2) a noun ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a particle specifying in time of a verb ⊕ ⇓ a particle of the person ⊕ ⇓ a particle

3) a noun ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ an inclination particle

4) an adjective ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ an inclination particle

5) an adverb ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a mortgaging particle ⊕ ⇓ a particle

6) exclamatory words ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a mortgaging particle ⊕ ⇓ a particle

7) words of imitation ⊕ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a mortgaging particle ⊕ ⇓ a particle

Logic-linguistic models of a conclusion *of verb* UL by *composition rules* has five types:

1) a noun ⊕ a verb ⊕ ⇓ a negative particle ⊕ ⇓ a particle of the person ⊕ ⇓ an inclination particle

2) a noun ⊕ a verb ⊕ ⇓ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a mortgaging particle ⊕ ⇓ a particle

3) a noun ⊕ a verb ⊕ ⇓ an affix forming a word ⊕ ⇓ a negative particle ⊕ ⇓ a particle of the person ⊕ ⇓ a particle

4) a verb ⊕ a verb ⊕ ⇓ an affix forming a word a negative ⊕ ⇓ particle ⊕ ⇓ a particle of the person ⊕ ⇓ an inclination particle ⊕ ⇓ a mortgaging particle ⊕ ⇓ a particle

5) a verb ⊕ a verb ⊕ ⇓ a negative particle ⊕ ⇓ a particle of the person ⊕ ⇓ a mortgaging particle ⊕ ⇓ a particle

Logic-linguistic models of a conclusion *of pronouns* UL has ten types:

1) a personal pronoun ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle
2) a demonstrative pronoun ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle
3) an interrogative pronoun ⊕ ⇓ a suffix of plural ⊕ ⇓ a case suffix
4) an attributive pronoun ⊕ ⇓ a case suffix
5) a negative pronoun ⊕ ⇓ a case suffix
6) a reflexive pronoun ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of a subject ⊕ ⇓ a suffix of a case ⊕ ⇓ a particle
7) an affix «алла» ⊕ ⇓ an interrogative pronoun ⊕ ⇓ a suffix of a subject ⊕ ⇓ a case suffix
8) an interrogative pronoun ⊕ ⇓ affixes of an interrogative pronoun
9) a demonstrative pronoun ⊕ ⇓ affixes of a demonstrative pronoun ⊕ ⇓ a particle
10) an uncertain pronoun ⊕ ⇓ a suffix of plural ⊕ ⇓ a suffix of a subject ⊕ ⇓ a case suffix

Logic-linguistic models of a conclusion *of adverbs* UL has six types:

1) a noun ⊕ affixes forming an adverb
2) an adjective ⊕ affixes forming an adverb
3) a pronoun ⊕ affixes forming an adverb
4) the numeral ⊕ affixes forming an adverb
5) an adverb ⊕ ⇓ affixes forming an adverb
6) a prefix of an adverb ⊕ a noun

The logic-linguistic model of a conclusion *of numerator* UL will be expressed as:
numerator ⊕ ⇓ an affix forming a word ⊕ ⇓ suffixes of plurals a suffix ⊕ ⇓ of a case ⊕ ⇓ a particle

IV. LOGIC-LINGUISTIC MODELS OF OFFERS

Logic-linguistic models of a conclusion *of narrative offers* UL has eighteen types:

1. pronoun ⊕ ⇓ a postposition ⊕ ⇓ a noun ⊕ a verb ⊕ ⇓ the union ⊕ ⇓ an adjective ⊕ ⇓ a noun ⊕ ⇓ a verb
2. noun ⊕ an adverb ⊕ an adjective ⊕ ⇓ a noun ⊕ ⇓ a pronoun ⊕ ⇓ an adjective
3. noun ⊕ the numeral ⊕ ⇓ an adverb the union ⊕ ⇓ ⊕ ⇓ an adjective ⊕ ⇓ a noun an adjective ⊕ ⇓ ⊕ ⇓ the numeral
4. adverb ⊕ a noun ⊕ a pronoun ⊕ ⇓ the union ⊕ ⇓ an adjective ⊕ ⇓ a noun ⊕ ⇓ a pronoun ⊕ ⇓ an adjective
5. modal word ⊕ a noun ⊕ an adjective ⊕ ⇓ a noun ⊕ ⇓ a verb
6. adverb ⊕ a noun ⊕ ⇓ a modal word ⊕ ⇓ an adjective ⊕ ⇓ a noun ⊕ a verb
7. adjective ⊕ a noun ⊕ ⇓ an adverb a verb ⊕ ⇓ ⊕ ⇓ the union ⊕ ⇓ an adjective ⊕ ⇓ a verb
8. noun ⊕ a pronoun ⊕ a verb ⊕ ⇓ the union ⊕ ⇓ a noun ⊕ ⇓ a verb
9. ⇓ particle ⊕ an adjective ⊕ a noun ⊕ a verb
10. ⇓ modal word ⊕ a noun ⊕ ⇓ a postposition ⊕ a verb
11. ⇓ modal word ⊕ a pronoun ⊕ ⇓ a postposition ⊕ a verb
12. pronoun ⊕ ⇓ a postposition ⊕ a noun ⊕ a verb ⊕ ⇓ the union ⊕ ⇓ an adverb ⊕ ⇓ an adjective
13. noun ⊕ the numeral ⊕ a verb ⊕ ⇓ an adverb ⊕ ⇓ a noun ⊕ ⇓ a verb
14. ⇓ modal word ⊕ a noun ⊕ the numeral ⊕ ⇓ a pronoun ⊕ ⇓ a verb
15. ⇓ particle ⊕ a noun ⊕ ⇓ a postposition ⊕ a pronoun ⊕ ⇓ a particle ⊕ ⇓ the numeral ⊕ ⇓ an adjective ⊕ ⇓ a noun ⊕ ⇓ a verb
16. adverb ⊕ ⇓ a pronoun ⊕ ⇓ the union ⊕ a noun ⊕ a verb
17. pronoun ⊕ ⇓ an adverb ⊕ ⇓ an adjective ⊕ ⇓ a noun ⊕ a verb
18. adjective ⊕ a noun ⊕ ⇓ an adverb ⊕ a pronoun ⊕ a verb

Logic-linguistic models of a conclusion *of questions* UL has nineteen types:

1. adverb $\oplus$ an interrogative pronoun $\oplus$ a verb
2. interrogative pronoun $\oplus \Downarrow$ an adverb $\oplus \Downarrow$ an adjective $\oplus$ a verb $\oplus$ a noun
3. pronoun $\oplus \Downarrow$ a noun $\oplus \Downarrow$ an adverb $\oplus \Downarrow$ an adjective $\oplus \Downarrow$ a noun $\oplus \Downarrow$ a pronoun $\oplus \Downarrow$ a noun $\oplus$ a verb
4. $\Downarrow$ particle $\oplus$ a noun $\oplus$ an adverb $\oplus$ a verb
5. $\Downarrow$ particle $\oplus$ a pronoun $\oplus \Downarrow$ an adverb $\oplus$ a verb $\oplus \Downarrow$ the union $\oplus \Downarrow$ a noun $\oplus \Downarrow$ a verb
6. adverb $\oplus$ a pronoun $\oplus \Downarrow$ an adjective $\oplus \Downarrow$ a noun $\oplus$ a verb
7. the union $\oplus \Downarrow$ a noun $\oplus \Downarrow$ a postposition $\oplus$ a verb
8. $\Downarrow$ particle $\oplus$ a pronoun $\oplus \Downarrow$ a postposition $\oplus \Downarrow$ a noun $\oplus$ a verb
9. $\Downarrow$ particle $\oplus$ a pronoun $\oplus \Downarrow$ an adjective $\oplus$ a noun $\oplus$ a verb $\oplus \Downarrow$ an adverb
10. $\Downarrow$ particle $\oplus$ an adverb $\oplus$ a pronoun $\oplus \Downarrow$ a noun $\oplus \Downarrow$ an adjective $\oplus$ a verb
11. $\Downarrow$ particle $\oplus$ a pronoun $\oplus \Downarrow$ an adjective $\oplus \Downarrow$ a noun $\oplus$ a verb
12. the union $\oplus \Downarrow$ a pronoun $\oplus \Downarrow$ a postposition $\oplus$ a verb
13. noun $\oplus \Downarrow$ a pronoun $\oplus \Downarrow$ an adverb $\oplus$ a verb
14. $\Downarrow$ particle $\oplus$ the numeral $\oplus \Downarrow$ a noun $\oplus$ a verb
15. $\Downarrow$ particle $\oplus$ the numeral $\oplus \Downarrow$ a noun $\oplus \Downarrow$ an adjective $\oplus \Downarrow$ a noun $\oplus$ a verb
16. adjective $\oplus \Downarrow$ a noun $\oplus$ the numeral $\oplus$ a verb
17. pronoun $\oplus \Downarrow$ the union $\oplus \Downarrow$ a noun $\oplus \Downarrow$ the numeral $\oplus \Downarrow$ an adjective $\oplus \Downarrow$ a noun $\oplus$ a verb
18. the union $\oplus \Downarrow$ an adverb $\oplus \Downarrow$ a pronoun $\oplus \Downarrow$ the numeral $\oplus \Downarrow$ a noun $\oplus \Downarrow$ an adjective $\oplus \Downarrow$ a noun $\oplus \Downarrow$ a verb
19. the union $\oplus \Downarrow$ an adverb $\oplus$ a noun $\oplus$ a verb

Logic-linguistic models of a conclusion *of exclamatory offers* UL has sixteen types:

1. exclamatory word $\oplus$ a noun $\oplus \Downarrow$ an adverb $\oplus \Downarrow$ a noun the numeral $\oplus \Downarrow \oplus \Downarrow$ a noun $\oplus$ a verb
2. $\Downarrow$ particle $\oplus$ a noun $\oplus$ a verb
3. $\Downarrow$ particle $\oplus$ an adjective $\oplus$ a verb
4. $\Downarrow$ particle $\oplus$ a pronoun $\oplus$ a verb
5. pronoun $\oplus \Downarrow$ the numeral $\oplus$ a verb $\oplus \Downarrow$ the union a noun $\oplus \Downarrow \oplus \Downarrow$ a verb
6. the numeral $\oplus$ a verb $\oplus \Downarrow$ a noun $\oplus \Downarrow$ an adverb
7. verb $\oplus$ a noun
8. the numeral $\oplus \Downarrow$ a noun $\oplus$ a verb
9. pronoun $\oplus \Downarrow$ a noun $\oplus$ a verb
10. verb $\oplus \Downarrow$ a pronoun $\oplus \Downarrow$ a noun $\oplus$ a verb
11. exclamatory word $\oplus \Downarrow$ a noun $\oplus$ a verb
12. pronoun $\oplus \Downarrow$ a noun
13. adjective $\oplus \Downarrow$ a noun $\oplus$ a verb
14. verb $\oplus \Downarrow$ a verb
15. the numeral $\oplus \Downarrow$ a noun $\oplus \Downarrow$ a pronoun $\oplus$ a verb
16. pronoun $\oplus \Downarrow$ the numeral $\oplus \Downarrow$ a noun $\oplus$ a verb

V. CONCLUSION AND FUTURE WORK

In present article models of words and offers on types of the Uzbek language have been offered logic-linguistic. 62 models on types of words and 53 models on types of offers of the Uzbek language have been developed. The developed models of words and offers of the Uzbek language are obligatory at a stage of architecture of technology a lot of the language modeled computer interpreter. In the initial version of system of the computer interpreter «Tarjimon-LMX» inclusion of three languages – English, Russian and Uzbek is planned. Thus, there will be a transfer possibility in six directions.

In the future work on working out of mathematical models of words and offers of the Uzbek language on the basis of offered in the present work logic-linguistic models is necessary.

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