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The Problem Of Morphological Construction Of The Verb In Improving The System Of Digital Automatic Translation Of Words On The Uzbek Language

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ABSTRACT

Objective: this article will talk about the construction of the verb in the system of digital automatic translation of words in Uzbek. **Methodology:** Identifying types of morphological analysis stages and general paradigms, differences of source and target languages. The verbs in Uzbek have own peculiarities in respect of forms and analytical characteristics. **Results:** There is compound verb, word combination; verbal word combination and their forms play important role for computational morphology. **Conclusion:** The article shows modeling of grammar categories based on forms, bounding of syntactic attitudes and combinations of affixes in forms of verbs.

KEYWORDS: Natural language, Machine translation, Analytic forms, Automatic morphology, Natural language processing

Introduction

One obvious merit of information technologies that cause to develop science and to affect positively optimized infrastructure industry of sphere of knowledge, mainly to connect with broadband communication over the worldwide. Broadly speaking, the systems of each branches of society reformed after established independence in our country. Furthermore, having become progressive changes educational system has been progressed simultaneously since those years. Particularly, spreading in a large scale of computational technologies, namely exposing of opportunity using of Internet system made open the door of the world to face serious issues in science. Most of the directions of sciences crossing with computer have appeared and proceeded.

As one vivid example is that Computational linguistics turned up in 2000s by affords of professor A.Pulatov where it was established as the first the laboratory at Uzbek philology faculty in National University of Uzbekistan named Mirzo Ulugbek (NUUz). It was basic aim to formulate conceptualization ideology for Uzbek computational linguistics. Those years some topics investigated by the students of master circle of themes modeling, machine translation, automatic orthography, creating of information style of Uzbek. In the direction of machine translation mathematics PhD M.Xakimov (NUUz) has applied many researches on mathematic modeling approaches for multilingual machine translation. The number of application of works done under his supervisor. Some handbooks and course books were created, namely “Computational linguistics” (A.Pulatov, 2011), “The foundations of Computational linguistics” (A.Rakhimov, 2011), “The linguistic basics of machine translation” (N.Abdurakhmonova, 2012) etc. Nevertheless, most implemented works were in theoretical aspect, so there were not any real programs based on full linguistic database. Currently Computational linguistics as a science is being taught in several State universities in Andijan, Namangan, Fergana, Khorazm, Samarkand, Bukhara districts of Uzbekistan. Most of all the center of investigation for CL is Tashkent State University of the Uzbek language and Literature University named after Alisher Navoiy that was established on 13 May 2016 by decree of the first president I.A.Karimov. Despite of fluctuations researches, after the decree for CL it may consider reaching peak of attention to project and recreate

the program of BA and MA courses in spite of very short time. Because according to this decree some essential matters were pointed vividly: "…providing appropriate place of our native language in the Internet world information system, its computational style, scientific-methodic manuals connecting with automatic translator and e-dictionaries, preparing applied recommends and to implement widely results that achieved successfully in practice". We should admit willingly this respectful attitude the Uzbek language, the stream of any kind of research turns only positive side.

The Uzbek language is the language of great Alisher Navoi who founded a rich treasure of the language. As we know, the Uzbek language belongs to Turkic languages and admittedly, it has long-standing history with changeable positions its own destiny by different factors. Its own peculiarities among other languages we can see in every tier of linguistics. For example, as we cite an example saved vowel harmony in the words like üzüm, velâyet in phonetics and kept national words in Turkish. However, there are more loanwords in Uzbek than Turkish. For example, management, budget, test from English, стол, поезд, бухгалтер from Russian, vazir, maktab, maorif from Arabian. On the one hand, lexicology considered very dynamic system deals with social and political situations as well. That is way if we say about Uzbek its grapheme system has also amended several times for centuries. After established independence of Uzbekistan, namely in 1989 the Uzbek language was admitted as state language it had been reforms to improve it constantly. One of them is orthographical rules founded Latin writing settled in 1995.

One significant issue of computational linguistics in Uzbek to create computational analyzer.

Materials and methods

The approaching of repsenting grammatical senses, derivation, word formation rules and the forms of formal models in morphology is considered as linguistic procedure. Morphological formal models appeared by usage of word combinations and relations each other in the text. Formal models always exist in the syntagma. Syntagma is semantic-syntactic unit that expresses some unified words as meaningful part of the sentence. Linguistic database involves grammar and dictionary. Generally, parsing implemented by basic three phases during automatically process: (Table 1)

Table 1. Grammar consists two part, namely morphology and syntax.

Parts of speech of Uzbek:			
Dominant elements of a sentence		secondary elements of a sentence	separated groups of the words
Noun	Adverb	Conjunction	Interjections
Verb	Numeral	Auxiliary (Yuklama)	Imitative words
Adjective	Pronoun	Helping words (ko'makchi)	Modal words

1) Parts of speech
2) Parts of sentence
3) Types of sentence

Uzbek is a morphologically rich language with nouns, adjectives and verbs inflected for case, number and forms of the words. This property requires introducing morphological information inside the MT system to handle the lack of many inflectional forms. It is momentous to create formal grammar of Uzbek for machine translation.

Uzbek has an agglutinative morphology with productive inflectional and derivational suffixes. Because of the suffixes can be added consecutively, one word can convey a lot of

information like possessive information, plural/singular, case information, mood etc. Case variation is a widespread linguistic phenomenon. (Kang, 2015)

The literatures that devoted to formal syntax has two major approaches to case assignment can be found. The first approach, which is mainly associated with Noam Chomsky's work, considers case as a syntactic phenomenon that licenses NPs; the second approach, put forward in the work by Alec Marantz, treats case as a post syntactic, purely morphological phenomenon.

There are following models derivation of Uzbek: W+A=>olma+zor

A+W=>be+foyda W+W=>tez+yurar W-W=>ota-ona

W W=>sotib olmoq

W-u/yu W=>Erta-yu kech

Due to lack of grammatical information for natural language processing, it is aim to input descriptive language for the linguistic database.

Modeling of grammatical categories in Uzbek is done in the frame of English for machine translation. English and Uzbek belong to different language family. Therefore, finding unique feature and differences of both languages considered significant matter for morphological analyzer. Let us we see this process as example of the verb in Uzbek.

It goes without saying that translation process is difficult job due to mental and conceptual matters which exist in different language family, society and cultures of humanity. Linguistical (ambiguity, synonymy) and extralinguistical (psychological) factors affect the quality of the product of translation. Even human translator faces to such hindrance in the process of translation, machine translation comes across these problems as well. As stated above whether related or unrelated language is taken for machine translation, there are some conceptual ideology between languages. Kemal Altıntaşh truly estimated as comparing Crimean Tatar and Turkish languages, "the word order and the duties of words in the sentence are most of the time similar. The roots are usually similar, but sometimes they may have different meanings in the two languages". Machine translation among Turkic languages is easier than unrelated languages.

Verbs inflect for number, gender, person and tense, and the two languages share a complex and similar verb structure and inflection system. The two languages share the same verbal forms:

1. The perfective form is used for the past tense in Uzbek

2. The imperfective is used for the future tense in English but is used for a variety of tenses in Uzbek (past, present and future) in coordination with various moods and particles.

3. The imperative

4. The active and passive participles are used for present tense in English and to a lesser extent as a verbal in Uzbek. Verb contains these grammatical categories:

lexeme	- >	o‘qidim
aspect	- >	simple
person	- >	first
number	- >	singular
voice	- >	active
mood	- >	indicative

Table 2. Verb categories

If one looks at agglutinative languages like Finnish, one finds that morphosyntactic features are encoded systematically by individual morphemes that are arranged in particular linear orders.

There are more than 50 affixes give new sense of inflectional verbs, just under 30-word formation affixes; syntactic affixes covered more than 30 forms. Overall qualities verbs in Uzbek consist of more than 6000 words in lexicon. There

are about 207 types suffixes (including variation) of parts of speech in Uzbek languages and 130 of them are defined as verbs. In order to add endings to the bases of each words it needs to separate one or another part of speech into paradigms.

In the morphological analysis, stems of words are given in the dictionary with grammatical information and rules. As comparing the stem of "uchmoq" we could see some examples of different models of the following verb structures:

1) Simple verb – uchmoq (fly)

2) Compound verb – uchib ketmoq (fly away)

3) Collocation – samalyot uchirmoq (fly the plane)

4) Verbal word combination – varrak uchirib bermoq (fly the kite to smb.)

5) Modal word combination – uchirish kerak (must fly)

6) Idioms – kapalagi uchib ketmoq (be afraid)

there are two types of analytical forms of the verbs in Turkic languages:

- analytical forms of conditions;
- analytical forms of modality;
- analytical forms of other mood.

Apart from these, morphological analyzer should parse correctly each segments in the text. Otherwise, some homonymic problems surface in the translation of the units in the text. For instance verbal word combination qo‘yib berdi is used in many functions as homonym in the context like the following examples:

U hujjatni stolga qo‘yib berdi-> He gave document as putting on the table.

U bolani hovlida o‘ynab olishiga qo‘yib berdi-> He let the boy play in the yard.

Direktor ko‘rsatilgan hujjatlarga darhol imzo qo‘yib berdi-> The director signed abruptly brought documents.

U bolalar o‘ynab olsin deb, sho‘x ashula qo‘yib berdi-> He played music so that to dance the children.

Database and semantics of verbal word combinations are investigated very little even in Uzbek. Considering all of them main verb, there are not any pure verbal helping verbs that they are used independently. They are about 30 types of the verbs but they give different meanings to the notional verbs. They are: ber (ver), bil, bit (bitir), bor, boshla, boq, bo‘l, et, yoz, yot, kel, ket, ko‘r, ol, sol, tashla, tur, tush, chiq, yubor, yur, o‘l, o‘t, o‘tir, qara, qol, qo‘y. There are two types model of verbal combinations:

- (MV+b/ib) HV
- (MV+a/y) HV

1) ber/ver (yoza berdi)
2) bil (topa bildi)
3) bor (o‘zgara bordi)
4) boshla (yoza boshladi)
5) yoz (yiqila yozdi)
6) ket (gapira ketdi)
7) ko‘r (ayta ko‘rma)
8) ol (unuta oldi)
9) sol (kela solib)
10) tur (yoza tur)
11) qol (ayta qol)

The meanings of verbal word combinations: (Table 3)

Table 3. Meanings of verbal word combination

form	meaning	Example
-(ı)b ber	Direct activity to another person	qo‘yib ber, bilib ber
-a/y ber	Continuity	ko‘chaver, o‘ylayver

-a/y ol/bil	Capability	tuzata oldi, foydalana bil
-(i)b bit/bitir	Perfect aspect	yonib bitgan, ekib bitir
-i)b, -a/y bor/kel	Continuity	unutib bordi, o‘zgartira bor
-a/y boshla	Beginning	yura boshla, o‘qiy boshla
-(i)b boq/ko‘r/qara	Proof	o‘qib boq, o‘ylab qara, yozib ko‘r
-(i)b bo‘l	Perfect activity	yozib bo‘l, yuvib bo‘l, qazib bo‘l
-(i)b et	Perfect activity	anglab etdi, pishib etmagan
-a/y yoz	Close to activity	qula yozdi, yorila yozdi
-(i)b yot/tur/o‘tir/yur	Continuity	o‘qib yot, aytib tur, yozib o‘tir
-(i)b ket	Beginning and Continuity	tarqab ketdi, isib ketdi, g‘ovlab ketdi, maqtab ketdi
-a/y ket	Beginning and Continuity	o‘qiy ketdi, gapira ketdi
-(i)b sol	Activity perfect	aytib sol, yuragini to‘kib soldi
-a sol	Activity in turn	ola solib ot, kela solib boshla, tura solib tashlan
-(i)b tashla/yubor	Full and fast appeared activity	o‘qib tashla, to‘qib tashla, haydab yubor
-(i)b chiq	Finish	o‘qib chiq, so‘rashib chiq, aylanib chiq
-(i)b tush	Completely	ag‘darilib tushdi, yiqilib tushdi, yoqib tushdi, yarashib tushdi
-(i)b o‘l	Continuity and Repeated	mudrab o‘lyapman, surishtirib o‘ldi, sog‘inib o‘ldi, chanqab o‘ldi
-(i)b o‘t	Perfect	bo‘lib o‘tdi, gapirib o‘t
-(i)b qol	Unexpected and continuity	tikilib qol, serrayib qoldi; kelib qoldi, so‘rab qol; jonlanib qoldi
-a/y qol	Permission, agree, wish	bora qol, yura qol, keta qol
-(i)b qo‘y	Continuity and once time activity	suyab qo‘y, ilib qo‘y; o‘ylantirib qo‘y, shoshirib qo‘y; qarab qo‘y, yo‘talib qo‘y

Helping verbs are sometimes written as shortened forms or compound verbs: aytib yubor – aytvor, bora ber – boraver, unuta olmadi – unutolmadi.

In contains of such kind of verbs there are several verbs: aytib berib tura qol, aytib bera olmay qoldi. Every time the first part of the verbs is considered main verb: Aytib (main verb) ber (helping verb), aytib (main verb) berib tur (helping verb). (Kim, 2015)

Verbal word combination looks like to compound verbs, but only the first component of the verb give main meaning others help to this main verb, in compound verb save both of the components save independent meanings. We see three the same model:

1. (MV+PP) HV=> oshib tushmoq (Compound verb)

2. (MV+PP) HV=> oshib ketmoq (Verbal word combination)

3. (MV+PP) HV=> to‘pni oshirib uzatmoq (Collocation)

1) if taken off helping verb from notional verbs, so combination may have a few change in the meaning: yozib bordi (write on) – yozdi (write), isib ketdi (warm up) – isidi (get warm). Nevertheless, taken off helping verb from compound verb it will be entirely changing of sense word, because helping verb participate to derivate a new word: sotib ol (buy) – sot (sell); ishlab chiqardi (produce) – ishladi (work);

2) there are more than two independent units of collocation in the text: Quvonib (modifier) so‘zladi (predicate) – he talked joyfully; in verbal word combination there is only one predicate: O‘ylab qoldi (predicate).

The affixes of voice and negative form could be added both parts of verbal word combination: to‘xtatib qo‘yishdi; aytib qo‘yma, aytmay tur, aytmay turma; the affixes of tense, mood, person are joined to helping verbs. Apart from these syntactic forms are existed simultaneously in both parts of the verb: tamomlashdi-qo‘yishdi.

It is customary in discussions of morphology to talk about inflectional versions derivational morphology in Uzbek, in terms of the types of features each of these encodes.

It is important issue that modeling of grammatical forms in machine translation:

1) Modelling of verbal word combinations;

2) Finding adequate sense of verbal word combinations in English. These are general models for verbal word combinations:

- MV HV->o‘qib berdi
- MV+HV->berolmadi<=> bera olmadi
- [MV]-[HV]->yozdi-qo‘ydi

1.1. Here is some peculiarities for modelling: MV-main verb (MV – such main verbs keep own notional meanings) HV1-helping verb (HV1 – such verbs are added after -b/-ib affixes) HV2-helping verb (HV1 – such verbs are added after -a/-y affixes)

- MV+HV1=>aytib berdi
- MV+HV2=>so‘zlay oldi

Verbal word combinations are similar to phrasal verbs in English (look up, look forward) that some of the preposition or adverbs give additional meanings to notional verbs (Table 4)

Table 4. some of the preposition or adverbs give additional meanings to notional verbs

o‘qib bo‘l-	Mushtariy kitobni o‘qib bo‘ldi.	Mushtary has finished the book.
o‘qib chiq-	Mushtariy kitobni o‘qib chiqdi.	Mushtary had read the book through.
o‘qib tur-	Mushtariy kitobni o‘qib turdi.	Mushtary used to read the book.
o‘qib yubor-	Mushtariy kitobni o‘qib yubordi.	Mushtary read the book suddenly.
o‘qib tashla-	Mushtariy kitobni o‘qib tashladi.	Mushtary easily has read the book.
o‘qib ol-	Mushtariy kitobni (qayta) o‘qib oldi.	Mushtary read the book one more.
o‘qib ko‘r-	Mushtariy kitobni o‘qib ko‘rdi.	Mushtary tried to read the book.
o‘qib qo‘y-	Mushtariy kitobni (o‘zi uchun) o‘qib qo‘ydi.	Mushtary read the book for herself.
o‘qib ber-	Mushtariy kitobni (ukasiga) o‘qib berdi.	Mushtary read the book her brother.
o‘qib ket-	Mushtariy kitobni (to‘xtamay) o‘qib ketdi.	Mushtary read the book without no pause.

Nevertheless, similarity in both languages, there is one significant angle of phrasal verbs changed definitely the meanings unlike verbal phrasal verbs in Uzbek. In addition, it cannot compare two categories as the morphological unit owing to own specificity of languages and the models of verbal word combination according to coming in what and how position are different:

- MV+HV=> ko‘rib qoldi
- MV+HV $_{(1)}$ + HV $_{(2)}$ =>ko‘rsatib bera oldi
- MV+HV $_{(1)}$ + HV $_{(2)}$ +HV $_{(3)}$ =>berib qo‘ya qoldi
- MV+HV $_{(1)}$ + HV $_{(2)}$ +HV $_{(3)}$ +HV $_{(4)}$ =>aytib berib qo‘ya qoldi
- MV+HV $_{(1)}$ + HV $_{(1)}$ =>o‘qib tura tur
- MV $_{(1)}$ +HV $_{(1)}$ =>tura tur
- MV $_{(1)}$ +HV $_{(1)}$ +HV $_{(2)}$ =>turib tura

qolgin

As we pointed above, some models [verb + verb] include the same roots may come several times and they give separately meanings in the text.

Conclusion

In general, linguistic models and semantic relations of each unit in machine translation play important role to build database. Due to globalization process, everything is getting to change into apace; additionally, there is not any hindrance to unify cultural and social attitudes among people. So understanding other foreign language has become a very crucial thing that we cannot ignore it. Today the result of machine translation which was appeared last in the mid of century impacted expand researches in this sphere one is the direction of computational linguistics and state of the art information technologies give opportunity to use them in any kind of branches of public. As far as we know that, a good machine translation is one of the tools of the trade for translation procedure. Using only grammatical models cannot solve all problems in machine translation system. It goes without saying that subsumption of entries into dictionaries according to grammatical information, helps to seek in the linguistic database. However, if it keeps going not attentively full information of language, artificial intelligence is still stay only translator toolkit during translation process.

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