IEEE Turkey Section

UBMK'22

Bildiriler Kitabı
Proceedings

7. Uluslararası Bilgisayar Bilimleri ve Mühendisliği Konferansı

7th International Conference on Computer Science and Engineering

14-15-16 Eylül (September) 2022 Diyarbakır - Türkiye

UBMK’2022’ye Hoşgeldiniz
Welcome to UBMK’2022

Sevgili Katılımcılar:

UBMK uluslararası nitelikli konferans serisi, 1990 yılından beri düzenli olarak yapılmakta olan Bilgisayar Mühendisliği Bölüm Başkanları toplantılarında alınan bir kararla altı yıl önce başlamıştır. Konferansın 7.si UBMK-2022 bu yıl 14-15-16 Eylül, 2022 günlerinde Dicle Üniversitesinin ev sahipliğinde düzenlenmiştir. COVID-19 salgını biraz hafiflediği için konferans bildirileri yüz yüze sunulabilmiştir.

UBMK-2022 konferansına bu yıl Amerika Birleşik Devletleri, Hindistan, Kazakistan, Kırım, KKTC, Rusya, Özbekistan, Tataristan,Nijerya ve Türkiye’den 150 den fazla bildiri yollanmış ve bu bildiriler Türk ve yabancı 250 hakem tarafından değerlendirilmiştir.

Her bildiri iki hakem tarafından incelenmiş ve uzlaşma olmadığı durumlarda üçüncü bir hakemin değerlendirmesine başvurulmuştur. Bu değerlendirmelerin sonunda 103 bildirinin sözlü olarak sunulması uygun bulunmuştur. Kabul edilen ve sunulan bildiriler içerik ve kalite ölçünlerini sağlaması durumunda IEEE Xplore’da yayımlanacaktır.

Konferans çalışmalarında, Bilgisayar Mühendisliği Bölüm Başkanları Danışma Kurulu olarak görev almışlardır. Bildirilerin değerlendirilmesi Bilim Kurulu üyeleri tarafından yapılmıştır. Konferansın düzenlenmesi ise Yürütme Kurulunun önerileri doğrultusunda, Düzenleme Kurulu tarafından yapılmıştır.

Son olarak, konferansın başarılı bir şekilde yürütülmesi için tüm olanaklarını sunan Dicle Üniversitesi Rektörü Sayın Prof. Dr. Mehmet Karakoç’a teşekkür ediyoruz.
Ayrıca Düzenleme Kuruluna, bildirileri titizlikle değerlendiren Bilim Kurulu Üyelerine ve değerli araştırmalarının sonuçlarını bilişim camiası ile paylaşan bildiri sahiplerine teşekkürlerimizi iletiriz.

Prof. Dr. Eşref ADALI
UBMK-2022 Konferans Başkanı ve Bildiri Kitabı Editörü

Dear Participants:

The UBMK international conference series started seven years ago with a decision taken at the Computer Engineering Department Heads (BMBB) meetings, which have been held regularly since 1990. The 7th edition of the conference, UBMK'22, was held this year on September 14-15-16, 2022, hosted by Dicle University. Conference as the COVID-19 outbreak eased a bit paperss were presented face-to-face.

More than 150 papers from the United States of America, Crimea, India, Kazakhstan, TRNC, Uzbekistan, Tatarstan, Nigeria and Turkey were presented to the UBMK'22 conference this year, and these papers were evaluated by 250 Turkish and foreign referees.

Each paper was evaluated by two referees, and in cases where there was no consensus, a third referee was consulted. At the end of these evaluations, 103 papers were accepted for oral presentation. Accepted and presented papers will be submitted for inclusion into IEEE Xplore subject to meeting IEEE Xplore's scope and quality requirements.

During the conference, Heads of Information Engineering Departments took part in the Advisory Board. The evaluation of the papers was made by the members of the Scientific Committee. The conference was organized by the Organizing Committee in line with the recommendations of the Executive Committee.

Finally, we would like to thank Gazi University Rector Prof. Dr. Mehmet Karakoç for his continued support for the success of the conference. In addition, we would like to thank the Organizing Committee, the Scientific Committee Members who carefully evaluated the papers, and the owners of the papers who shared the results of their valuable research with the informatics community.

Prof. Dr. Esref ADALI
UBMK'22 Conference Chair and Proceedings Editor

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Business Process Modeling That Distinguishes Homonymy Within Three Parts of Speechs in Uzbek Language

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Abstract — One of the processes of natural language processing is the semantic analysis of texts. An important task of semantic analysis is to distinguish between the meanings of the words in the text and to distinguish their meanings. For the purpose of semantic analysis of homonymous words, they are divided into groups such as homonyms within 2 parts of speechs, homonyms within 3 parts of speechs and homonyms within 4 parts of speechs according to their occurrence within categories. In the Uzbek language, words that form a homonym are divided into 11 groups within 3 parts of speechs. In this article analyzes the linguistic factors that differentiate homonomy words in the Uzbek language, such as adjective or noun or adverb, noun or pronoun or verb, noun or adjective or verb, noun or verb or pronoun, noun or adjective or predicate word, noun or adverb or imitation word, noun or exclamation word or imitation word, noun or adjective or auxiliary, noun or number or verb, noun or verb or imitation word, exclamation word or verb or adverb develops a total of 7 mathematical models.

Keywords —*homonomy words, mathematical model, biznes-prodcess limited set, noun, adjective, verb, adverb, imitation word, exclamation word, auxilary.*

I. INTRODUCTION

The creation of a semantic analyzer of the Uzbek language is one of the important tasks in the field of computer linguistics.

In the process of creating a semantic analyzer of the natural language, a number of tasks are performed:

- Linguistic models will be developed;
- Mathematical models will be developed;
- Algorithms will be developed;
- The database structure of the system will be developed;
- The system interface will be developed;
- The system will be developed using the capabilities of the programming language.

Semantic analysis of texts through the system has several elements:

- hyponymy; [2] occupation
- homonomy
- polysemy;
- polyfunctionally;
- sinonymy;
- antonymy

The perfection of the semantic analysis of texts requires modeling of these elements. Initially, the elements are modeled linguistically. Based on linguistic models, mathematical models are developed. In this article we will talk about the modeling of the process of semantic analysis of omonym words in the Uzbek language.

II. MATERIALS AND MEHODS

A number of studies have been carried out on the issue of solving the problem of homonymy in Corpus Linguistics, touching homonymy units and eliminating homonymy in the process of automatic reading of the text. Included G.I.Kustova, O.N.Lyashevskaya, Ye.V.Paducheva, Ye.V.Rexiline, B.P.Kobrisov, T.I.Reznikova[3,155-174-p.] B.P.Kabrisav[4,1-45-p.], V.V.Kukanova[5, 3-22-p.] A.A.Kretov[6,3-10-p], A. Ye.Alexander [7,1-60-p], Y.E. Yermolayeva [8, 3-47-p] developed linguistic and mathematical models for the elimination of homonyms. In the few researches carried out in the direction of computer linguistics of the Uzbek language, there are actions on creation of analysis programs designed to “recognize” and “read” homonym units of computer memory; some considerations on the problems of touching homonyms in the Uzbek language, the first actions on drawing up the algorithm for determining homonym were carried out. Researcher Sh.Gulyamova the research work of a number of researchers such as will be an example of this. Research Fellow According to Sh.Gulyamova[9,146-149-p.], the differentiation of homonyms by dividing words into different categories shows an effective result. The studies studied show that an excellent semantic analyzer was not created in the linguistics of the whole world. But the first steps were taken to create a semantic analyzer. The National Corps of the Uzbek language is currently being created.One of the important steps in creating a semantic analyzer of the Uzbek language is to identify homonyms and distinguish their meanings. Words that form homonyms within the framework of three categories of words in the Uzbek language are classified as follows.

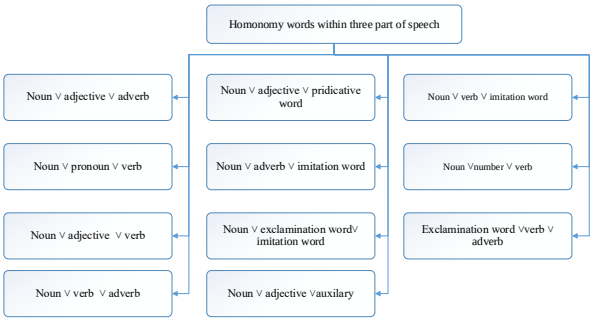

Fig. 1: Groups of categories of words that form homonyms of some words in the Uzbek language

Examples are given to homonym words that form the groups listed in the hierarchy in the queue. Mathematical models are developed using a filter to distinguish words that form such a homonym.

A. Adjective ∨ noun ∨ adverb homonyms between word categories

adj ∨ noun ∨ adv an example of the word SIRA is the word homonym between the categories. Sira the word has the following meanings:

1. Sira: Clear, true(adj)
2. Sira: No, never (adv)
3. Sira: The pronoun, the homonym between the word expressing the call (noun)

Qualitative adverb noun is analyzed for their properties in order to distinguish homonyms between categories of words in the context. The adjective is similar in the context of the noun series in terms of pronouns grammatically. Hence it is sufficient to bring a mathematical model that distinguishes homonym words between the categories of NOUN adverbs or adjective adverbs. Adjective homonym words between the noun categories differ by means of a Trigramm YMM [3, 46-51-p.]. Distinguish homonym words between qualitative and adverbial word categories by suffixes does not give an exact result. In the following sentences, their meanings are clearly manifested.

1. But to study in marriage sira. (Said Ahmad, Ufq trilogiyasi, 26-p)

2. Do not be disappointed now, the posture in which I told The Secret of the sentence (Said Ahmad, Ufq trilogiyasi, 327-p)

When we observed this word in the works of fiction, it was observed that when it became an adverb, then both before and after it can be combined with words of different categories, also at the beginning of the sentence. Considering these statistical data, the following mathematical formula is recommended.

$$H_{adj,adv} = \begin{cases} W_i^{adv\_b} \oplus H^{adv} + \downarrow aff^N \oplus W_i^{adv\_a} \\ \downarrow (\boldsymbol{N_k} + aff_j^N) \oplus H^{adj} \oplus \downarrow (\boldsymbol{N_k} + aff_j^N) \\ H^{adj} + aff^N \end{cases} \quad (1)$$

In here $H_{adj,adv}$- reliability between qualitative adverbs, H^{adv}- collection of homonyms in the word category of adverbs , $\oplus$- a sign that denotes the mutual combination of words, aff^N- a suffix that can be added to a word in the noun category, N- collection of words related to the noun category, $W_i^{adv\_b}$- adverb homonym is a finite set of words that is formed from a combination by the Left (Front), $W_i^{adv\_a}$- adverb homonym belonging to the word category is a finite set of words that can be attached by right (back) to the word. If the adverb is combined with a noun suffix to the homonym word belonging to the category of words, then $W_i^{adv\_a}$ – verb is a finite set of words from the category of words. The values of these collections are formed from works of art under the supervision of linguists and are included in the database.

B. Noun ∨ pronoun ∨ verb homonyms between word categories

We give an example of a word that expresses homonyms among the noun-pronoun categories.

1. Un: Product in the form of powder, which is formed by pulling the grain in the mill. (noun)
2. Un: old. voice. (noun)
3. Un: 2 the basis on which some verbs of the singular person pronouns are added (pronoun)
4. Un: Grow and unfold.(verb)

Un the following sentences were observed in the works of the Word.

1. Hamma yoq qabriston jimligiday unsiz, vahimali. (A.Hakimov.Ilonizidan)
2. Dildor unga yugurgan edi (Ufq r. 582-b)
3. *Ziyodaxon supra yozib, un elab o'tirar edi .(A.Qahhor, qo'shchinor chiroqlari)*
4. *Erta bahor, moychechaklar unib chiqqan payt edi.*

It is listed in these sentences *un* the suffix-pronoun is analyzed as follows, u pronoun –ga, - da, -dan when the suffixes are added n to increase. So in order to distinguish this type of homonyms, we recommend the following model.

$$H_{N,V,Pr} = \begin{cases} W_i^N \oplus H^N + \downarrow aff_i^N \oplus W_i^N \\ H^V + aff_j^V \\ unga \\ H^{Pr} = unda \oplus W_k^{Pr} \\ undan \end{cases} \quad (2)$$

$H_{N,V,Pr}$ – noun is a homonym between the pronoun categories, W_i^N – a set of compound words with the word homonym in the noun category, W_k^{Pr} – the pronoun is a set of words that can be combined by the right with the homonym belonging to the category of words, $W_k^{Pr} = \{aytmoq, ko'rmoq, bor, yo'q, olmoq, \dots\}$ aff_j^V- the verb is a suffix that can be added to words in the word category.

C. Noun ∨ adjective ∨ verb homonyms between word categories

Noun ∨ adj ∨ verb one of the words homonym between the categories of words is **Oshiq** So, which represents the following meanings.

1. ***Oshiq:*** *Hayvonning orqa oyog‘ida son bilan boldirni tutashtirib turuvchi so‘ngakcha (bolalar o‘yinida ishlatiladi) (noun)*
2. ***Oshiq:*** *Ortiq, keragidan ko‘p (sifat)*
3. ***Oshiq:*** *Shoshilmoq (fe'l)*

The word ***oshiq*** *was observed in the corpus data and in the works of art and it was found that it was encountered in the following forms*:

1. *Bobom bunga parvo ham qilmasdan, haligi odamni kutib olishga* ***oshiqdi.*** *(korpus m-t)*
2. *Umri davomida 40 yildan* ***oshiq*** *faoliyati Sharqshunoslik institutida o‘tdi.(korpus m-t)*
3. *Mening yoshligimda birga* ***oshiq*** *o‘ynab, yaxmalak otib o‘sgan bir og’aynim bor.(Oybek. Tanlangan asarlar)*
4. *Endi* ***oshiqning*** *ikki dunyosi islomiy, oxirati ulug‘.(korpus m-t)*

As a result of observations, the following mathematical model is formed

$$H_{Adj,V}=\begin{cases}\downarrow(\boldsymbol{N_i}+x)\oplus H^{adj}+x\ \oplus\downarrow(\boldsymbol{N_i}\ +\boldsymbol{x}),\ x\in\left\{aff_{s_{l_j}}{}^{N}\cup aff_k{}^{deg}\right\}\\ \downarrow W+dan\oplus H^{adj}+aff_{s_{l_j}}{}^{N}\\ H^{V}+aff_{s_{l_j}}{}^{V}\\ H^{N}+\downarrow x\end{cases}\quad(3)$$

In here $\boldsymbol{N_i}$ – adjective homonym in the word category is a set of words in the noun category, which can be combined with the word, H^{adj} – homonym in the adjective vocabulary is a set of words, x – the noun can be added to words in the category OLX a collection consisting of a combination of sets of suffixes that denote suffixes and degrees of quality, $\downarrow(W+)$- the adjective homonym means that the preposition –denoting can be combined with the suffix-denoting, $aff_{s_{l_j}}{}^{V}$ *va* $aff_{s_{l_j}}{}^{N}$- a set of suffixes that can be added to words in the verb and noun category, $H_{Adj,V}$- the phenomenon of homonym between the adjective and the verb categories. With the help of the presented mathematical model, the noun adjective verb is distinguished by homonyms between the word categories.

D. Noun ∨ verb ∨ adverb homonyms between word categories

Noun ∨ verb ∨ adv one of the homonyms between the word categories ***kech*** as a word, it means the following.

1. ***Kech:*** *Kechki payt, kechqurun (ot)*
2. ***Kech:*** *Belgilangan vaqtdan ancha keyin (ravish)*
3. ***Kech:*** *1. Birin-ketin o‘tmoq.*
   2. Suyuqlik, massa bo‘lib harakatlanib o‘tmoq.
   3. Bahridan o‘tmoq, da'vo qilmaslikka ahd qilmoq (fe’l)

Kech so‘zi gaplar tarkibida turli ma’nolarda uchrashi:

1. *Ular orasida* ***kech*** *qolgan abituriyentlar ham ko‘pchilikni tashkil qilgan.(korpus m-ti)*
2. ***Kechga*** *borib jala quyib tong otguncha momaqaldiroq guldirab chiqdi. (Said Ahmad, Ufq r.)*
3. *Bunda sinfdagi doskadan butunlay voz* ***kech****iladi. (korpus m-ti)*

Kuzatuvlar natijasida quyidagi matematik model hosil qilinadi.

$$H_{N,Adv,V}=\begin{cases}H^{Adv}+\downarrow aff_i^{adv}\oplus N,\quad i=1..n,\ aff_i^{adv}\in aff^N\\ H^{Adv}+\downarrow aff_i^{adv}\oplus V,\ i=1..n,\ aff_i^{adv}\in aff^N\\ \downarrow(N+ning)\oplus H^{Adv}+\downarrow i+\downarrow ni\oplus V\\ H^N+\downarrow aff_j^N\\ H^V+\downarrow aff_i^V\end{cases}\quad(4)$$

This review was recommended due to the morphological features of the word late. If such a pronoun is encountered in the form of a predicate, then it is worthwhile to use the compounds of the homonym.

- *Kech (noun) + kirdi/bo‘ldi/tushdi/…*
- *Kech(adv)+edi/*

In this case, words that unite with homonyms should be formed and entered into the database

E. Noun∨ adjective ∨ predicate words homonyms between word categories

Noun ∨ adj∨ homonym between the prepositional words can be an example of a crossword puzzle and means the following:

1. **Chog‘:** Vaqt, payt, on *(noun)*
2. **Chog‘:** Cama, taxmin *(noun)*
3. **Chog‘:** Hajmi kichik.*(adj)*
4. **Chog‘:** Yaxshi, ko‘tarinki holatda *(predicative word)*

Chog’ the following views were observed in the interrogative sentences:

- *Beshikdagi qulog‘ingga kirgan mungli va ayni* ***chog****‘da nurli allami?*
- ***chog*** *masjid darchasidan pir etib bir juft qush uchib kirdi-yu, Husanning xayoli bo‘lindi.*
- *Hammaning dimog‘i* ***chog****‘.*
- *Darhaqiqat, birinchi qo‘*ng‘iroq **—** ko‘ngillarni **chog‘** aylaguvchi sado.
- *O‘g’lim maoshizni* ***cho‘gi*** *pastmi deyman a?*

Noun ∨ adj∨ *predicate words* we recommend to distinguish the homonym between the predicative words with the help of their right and left conjugators. Adj and noun to words in the word category can be combined with the addition, which forms the same lexical and syntactic form. In conclusion, the collection of combinations of these types of omonym words with the help of the information of the Uzbek national corps, An Explanatory Dictionary of works of art and Omonym words is determined.

Noun ∨ adj∨ when distinguishing homonym words between predicative words, it is required to form the following groups of words:

1. When the noun refers to the category of words: *{shu, ayni, masjid,..}*
2. When the adjective refers to the word category: *{maosh, past, baland,…}*
3. Predicative: *{ko‘ngil, dimoq, dil, bo‘lmoq,..}*

It is desirable to form such groups of words as.

F. Noun ∨ Adverb ∨ imitation word homonyms between words

Noun ∨ Adv ∨ imitation we bring the word sheet to the homonym words between the words. This word has the following meanings:

- ***Varaq-varaq:*** *Juda ko‘p varaqlardan iborat bo‘lgan, varag‘i ko‘p (noun)*
- ***Varaq-varaq:*** *ayn. jaraq-jaraq (adv)*
- ***Varaq-varaq:*** *Qaynayotgan yoki oqayotgan suyuqlik tovushi haqida (imitation word)*

We give examples of the meeting of this word in the context:

*1) Aziza maktab yillarida **varaq-varaq** insho yozar, kitob o‘qir edi.*
*2) Kimyogar qo‘shnimiz bor. Laboratoriyasidagi probirkalardan doim **varaq-varaq** tovush eshitiladi.*

Sheet-sheet in the form belonging to the category of words ravish currently exchanged with Jarak. Taking into account the omission of imitations and adverbs word categories, it is concluded that the semantic analysis of these types of homonym words is carried out through the compounds of the word homonym.

G. Noun ∨ undov ∨ imitation homonyms between words

An example of a worm is the homonyms in this group.

– **Chuv:** The wheel-holding ear of the cart axle.*(noun)*

– **Chuv:** Gambling Mactan (choosing four Asik) win-win situation.*(noun)*

– **Chuv:** Indicates noise-suronic sounds (imitation word)

*Shepherd horses **chuv-chuv** would drive to the creek.*

Research shows that **chuv** the suffix usually comes in the form of repeated words. If we make a morphological analysis, the exclamation words do not take any additional. In such cases, we rely on the Word attachments. That is, there will be a need to form a set of words in which the consonant can be combined with the word homonym. So it is worthwhile to distinguish homonyms belonging to this group of words only with the help of their combination.

H. Noun ∨ adj ∨ auxiliary homonym words between an assistant

Noun ∨ adj∨ between the assistant ***sari*** let's give an example of the word.

- ***Sari:*** *1 Ma’lum tomonga, tomon qarab. 2 (-gan affiksli sfdsh. bilan) ayn. sayin (auxiliary)*
- ***Sari:*** *Eng yaxshi, sara (adj)*
- ***Sari:*** *Sariq, sariqrangli (adj)*
- ***Sari:*** *Hind ayollarining yubka shaklida belga bir necha bor o‘ralib, bir uchi ro‘mol qilib boshga tashlab qo‘yiladigan kiyimi (noun)*

Quality has the property of jumping. Therefore the noun adjective is determined by a mathematical model that distinguishes the homonym between the noun assistant that is the word Assistant, through the conjunctions that relate to the category of words.

İ. Noun∨ Number ∨ Verb homonyms between word categories

Uch word noun ∨ number ∨ verb homonym between the word categories is an example of a word and means the following.

- **Uch:** The beginning or the end part of something.
- **Uch:** Whole number between two and four.*(Number)*
- **Uch:** 1. Move along the air.*(Verb)*

2. One edge of the pocket is cut off.

3. To gossip

As a result of the observations, the following rules were established

- ***uch****+-i/-iga/-ni/-da ⊕ bor/ulamoq/boshlamoq/turmoq/... (Noun)*
- ***uch****+-inchi/-nchi/-ta/-tacha/-tadan/-larcha/ ⊕ oy nomlari/dars/uy/…(Number)*
- ***uch****+-ov/-ovlon/..⊕ gaplashmoq/ko‘rishmoq/kelmoq/ketmoq/… (son)*
- ***uch****+dan ⊕ bir/ikki/uch/to‘rt/…(number)*
- *Balandga/osmonga/… ⊕ uch (Verb)*
- *Toshkentdan/shahardan... ⊕ uch(Verb)*
- *Uch+-ib ⊕kel/ket/…*
- *{Uch+-ar ⊕ qush/gilam/…*

Taking into account the above morphological features, the model of homonym differentiation in the word category of numerals can be called as follows

$$H_{num,N,V} = \begin{cases} H^{num} + \downarrow aff_l^{ord} \oplus \downarrow (W_k^N + \downarrow aff_l^{ord}) \oplus N_j^c \\ \downarrow W_i^{dec} \oplus H^{num} + \downarrow aff_l^{ord} \oplus N_j^c \\ H^{num} + aff_j^{agg} \oplus V \\ H^{num} + dan \oplus W_n^{num} \\ N + x, \ x \in \left\{aff_{s\_l_i}{}^N\right\}, \ i = 1..n \\ V + x, \ x \in \left\{aff_{s_{l_j}}{}^V\right\}, \ j = 1..m \end{cases} \quad (5)$$

In here $aff_j^{agg} -$ collection of aggregating additives,$aff_j^{agg} = -ov, -ovlon, -ala, -ovi, -oviga, -ovloni, ..\}$, $W_n^{num} -$ a set of words consisting of the names of numbers, $W_n^{num} = \{bir, ikki, uch, \dots\}$, n=1..23, aff_l^{ord}- a set of suffixes that denote the order, quantity, adding to the number, $aff_l^{ord} = \{-nchi, -inchi, -ta, -tacha, -cha, \dots\}, \ l \in Z.$

For automatic differentiation of this type of homonyms, the formation of a set of compound words with each of them is required. That is, the number homonym is required to enter into the database by collecting data such as a set of nouns with which the suffixes representing the order are added, a set of nouns consisting of the names of the numbers, a set of suffixes that are added to the number, etc.

J. Noun ∨ Verb ∨ immitation word homonyms words between

Noun ∨ Verb ∨ in the case of the difference of homonyms between imitation words also look at their morphological and lexical features.

- ***Qiy:*** *Qo‘yning uzoq tepkilanib, qatlanib yotgan go‘ngi.(Noun)*
- ***Qiy:*** *Biror tomonga yotiq holda uzunasiga kesmoq. (Verb)*
- ***Qiy:*** *Odatda bo‘lishsiz formada keladi. (Verb)*
- ***Qiy:*** *Qiy-chuv (tartibsiz baqiriq-chaqiriqlar) (pious slaughter).*

Qiy two verbs in the suffix, three in the form of a noun mimic speech. To distinguish such words in context, if we make proverbs in artistic works

1. *Ko‘chada qizlarning qiy-chuvi eshitildi (Said Axmad, Ufq, 417-p)*
2. *Keyin yeyishga ko‘zi qiymagandek avaylab og’ziga soldi (Ufq r. 443-p)*
3. *Uchi yirtilsa, qiyib chatib oladi-da. (Ufq r. 581-p)*
4. *Issiqxonadagi egatlarga qiy to‘kib chiqishdi.*

Qiy basically, when the suffix becomes an imitation word qiy-chuv threer view. Further confirmation is omitted according to the morphological nature of the words, which means that imitation with a noun we distinguish words from each other by their combination. We know that the amount of imitation words is less than that of the noun, so it's relatively easy to collect words that can be combined with imitation words. And the homonyms in the word category Fe'l we distinguish by suffixes. Proceeding from these considerations, we recommend the following mathematical model.

$$H_{V,N,imit} = \begin{cases} H^{imit} - \oplus chuv + aff_i^N \oplus W_j^{imit} \\ H^N + aff_i^N \oplus W_k^N \\ H^V + aff_i^V \end{cases} \quad (6)$$

In here W_j^{imit} – here is a collection of words that can be combined with it when it comes to this kind of homonym imitation word. That W_k^N –this type of homonym is a set of words that can be combined with it when it refers to the noun category. It is recommended to make the difference of homonyms between the words noun and imitation with the help of this model.

K. . Verb ∨ adverb ∨ immitation word homonyms between word categories

To omonim words belonging to this group **ura** the word is exemplified and means the following.

- ***Ura:*** *Hu-jum qilayotgan jangchilarning jangovar nidosi; ko‘garinki ruhbilan ma’qullash yoki xursandlikni ifodalovchi nido, xitob*
- ***Ura:*** *Urmoq fl. rvdsh.(verb)*
- ***Ura:*** *Epchillik bilan, tezda (adv)*

Ura to compose a model that distinguishes the word, it will be necessary to make a morphological analysis.

1. Demak, ishlarni shunchaki “qog‘ozda”, “ura-ura”chilik asosida bajarish bilan ish bitmaydi.*(data of corpus)*
2. Ko‘chalardan birining nomini eshitganida yigitning tomiri yana tez **ura** boshlabdi. *(korpus m-ti) (verb)*
3. Bola bilan men qopqon tomon **ura** qochdik. *(N. Safarov, Olovli izlar)(adv)*
4. Nigora maosh olishi bilan **ura** solib uyiga jo‘naydi. *(P.Tursun, O‘qituvchi)(adv)*

From the quoted sentences, the following mathematical model is formed.

$$H_{E,V,Adv} = \begin{cases} H^{Adv} \oplus \begin{matrix} to\ make\ guesses \\ to\ run\ away \end{matrix} \\ H^V \oplus V \backslash \{ \begin{matrix} to\ make\ guesses \\ to\ run\ away \end{matrix} \} \\ H^E + \downarrow aff^N \\ H^E, \oplus H^E \end{cases} \quad (7)$$

With the help of this mathematical model, we distinguish the homonym between the exclamation word, the verb and the adverb categories.

III. RESULTS AND DISCUSSIONS

With the help of mathematical models that distinguish omonym words in the Uzbek language, alkortions were developed. On the basis of algorithms, an information system is developed, which makes semantic analysis of homonym words. The model of the semantic analyzer business process is described in Figure 2.

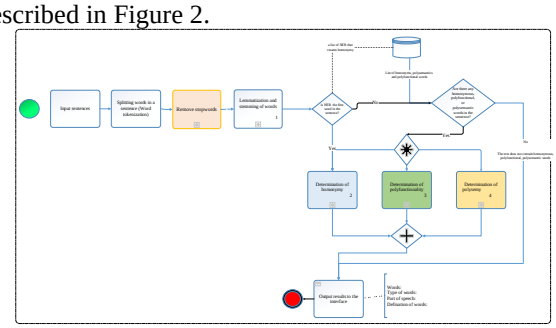

Fig. 2: Model of business process of semantic analyzer of Uzbek language

The process of identifying homonym words listed in the business process model also covers several processes in turn. Researcher Sh.Gulyamova modeled the Uzbek language homonyms linguistically by dividing them into two groups: homonym words within a single word category and homonym words within different categories.[10, 326-334-p.] The information system being created is based on these linguistic

models. Figure 3 describes a business process that identifies homonym words.

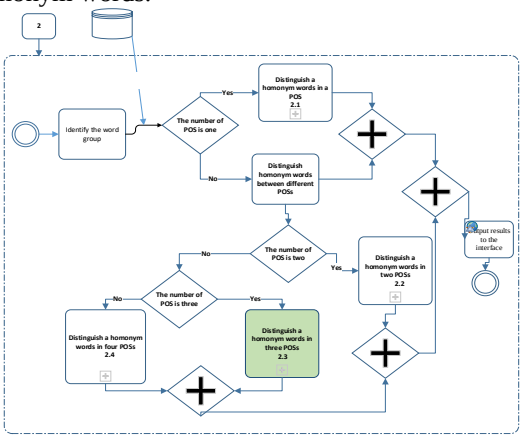

Fig. 3: Omonim is a business process model that identifies words

The model of the business process that generates homonyms within the framework of the three categories of words of the information system is presented in Figure 4.

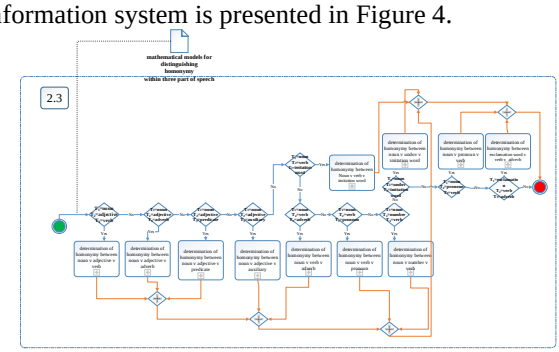

Fig. 4: Model of the business process that determines homonymy within the framework of three categories of words

4-fig the execution of the listed processes is carried out on the basis of mathematical models presented in the article.

IV. CONCLUSION

In the semantic analyzer of the Uzbek language, omonim relies on mathematical models to identify words and distinguish their meanings. Linguistic or mathematical modeling of homonyms, observed within the framework of different categories of words, requires determining exactly within which categories of words they form homonyms. If the noun is among the categories of words that are included in the composition, then it is impossible to distinguish them in many cases through the forms of grammatics. Sometimes even word categories that do not fall into the composition of the name can take dictionary and syntactic forms, characteristic of the same names. In such cases, the syntactic factor is distinguished by the principle of aggressiveness, taking the leading place and, accordingly, modeled. With the help of mathematical models developed in this article, the meanings of homonyms that form homonyms within the framework of three word categories are distinguished. Developed mathematical models play an important role in the creation of a semantic analyzer of the Uzbek language.

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