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Telif Hakkı

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2037	A Practical Investigation of Spear Phishing Spam Emails: Comparative Analysis and Evaluation		Kendrick Kurt Günter Bollens	772 - 777
2091	Multipurpose Malware Detection System		Mert Gursimsir Cem Ayar Ibrahim Sogukpinar	778 - 782
CRYP	1867	A New Method to Detect Malicious DNS over HTTPS via Feature Reduction	Ali K. Bozkurt Halil E. Aköz Ataberk Taşpınar Şerif Bahtiyar	783 - 788
	1939	Generative Adversarial Networks for Synthetic Jamming Attacks on UAVs	Burcu Sönmez Sarıkaya Şerif Bahtiyar	789 - 794
	1958	Detecting Corruptive Noise Rounds for Statistical Disclosure Attacks	Alperen Aksoy Doğan Kesdoğan	795 - 800
	1996	Future Directions of Cybersecurity in Industrial Internet of Things Through Edge Computing	Tamara Zhukabayeva Lazzat Zholshiyeva Nurdaulet Karabayev	801 - 806
	2061	Resource-Efficient Ensemble Learning for Edge IIoT Network Security against OSINT-based Attacks	Mert İlhan Ecevit Zakire Çukur Muhammed Ali İzgün Noor Ul Ain Hasan Dağ	807 - 812
	2074	Transfer Learning for Phishing Detection: Screenshot-Based Website Classification	Furkan Çolhak Mert İlhan Ecevit Hasan Dağ	813 - 818
	2145	Blok Şifrelerin Karıştırma ve Yayılım Tabakaları için Yeni Bir Analiz Aracı A New Analysis Tool for Confusion and Diffusion Layers of Block Ciphers	Mehmet Ali Demir Meltem Kurt Pehlivanoğlu Pınar Savaştürk Emir Öztürk Muharrem Tolga Sakallı Sedat Akleylek	819 - 824
CVIS	1851	Impact of Image Augmentation on Deep Learning-Based Classification of Granite Tiles	Gaye Ediboglu Bartos Sibel Ünalı Nesibe Yalçın	825 - 828
	1877	Advanced Facial Expression Classification with CNN-Transformer Integration for Human-Computer Interaction	Ali Azmoudeh Cigdem Altin Gumussoy Hazım Kemal Ekenel	829 - 834
	1936	Word Image Representation at Local and Global Levels Based on Vision Transformers	Baha Edine Harrath Mohamed Mhiri Mohamed Cheriet	835 - 840
	1949	Detecting Duplicate Products in E-Commerce Images Using Siamese Networks	Enis Teper Furkan Eseoğlu Mustafa Keskin	841- 846
	1963	Comparative Analysis of Visual Attribute Tagging Models for Upper-Body Clothing Products	Engin Kaya Mert Yanık	846 - 850
	1986	Development of A Model of Kazakh Sign Language Recognition Based on Deep Learning Method	Aigerim Yerimbetova Bakzhan Sakenov Ulmeken Berzhanova Nurzhan Mukazhanov Elmira Daiyrbayeva Mohamed Othman	851 - 856
	1989	Recognising Kazakh Sign Language with Mediapipe	Aigerim Yerimbetova Diana Kaidina Bakzhan Sakenov Elmira Daiyrbayeva Mussa Turdalyuly Ulmeken Berzhanova	857 - 862
	1990	Ultrason Görüntülerinden Meme Kanseri Teşhisi için Lezyon Tespitli Hibrit Derin Öğrenme Modelleri	Osman Doğuş Gülgün	863 - 868

		Hybrid Deep Learning Models with Lesion Detection for Breast Cancer Diagnosis from Ultrasound Images	Hamza Erol	
1992		Olumsuz Hava Koşullarında Gemi Tespiti ve Sınıflandırılması Ship Detection and Classification in Adverse Weather Conditions	Yahya İzala Yaşar Becerikli	869 - 874
2010		Removing Background from Noisy Handwritten Signatures on Banking Documents using GANs	Ege Dinçer Sacide Kalaycı Emre Yurdakul Bilge Köroğlu	875 - 879
2013		A Faster R-CNN Model for Multi-class Classification and Detection of Land, Air, and Sea Vehicles	Enes Güvelioğlu Çiğdem İnan Acı	880 - 885
2098		Çelik Hurdasının Sınıflandırılmasında ResNet ve Görüntü Dönüştürücü Tabanlı Modellerin Başarımı	Sefa Temur Levent Karacan	886 - 891
2117		Advanced Computer Vision Techniques for Reliable Gender Determination in Budgerigars (Melopsittacus undulatus)	Atalay Denkbalbant Efe İlhan Cemalcılar Majid Ahangari Abdussamat Saidburkhan Alireza Zirak Ghazani Erkut Arıcan	892 - 897
2151		Teslimat Süresi Tahminlerinde Makine Öğrenmesi Modellerinin Yorumlanabilirliği Interpretability of Machine Learning Models in Delivery Time Predictions	Serhat Agit Satıcı Habil Kalkan	898 - 903
2169		Deep Learning based Order Form Recognition	Enes Alperen Buğaz Orhan Akbulut Aysun Taşyapı Çelebi Uğur Yıldız	904 - 908
2170		Learning Based Photo Management on Smartphones	Beyza Nur Şenay Orhan Akbulut Aysun Taşyapı Çelebi Uğur Yıldız	909 - 912
2177		Retinal Disease Classification Using Optical Coherence Tomography Angiography Images	Omer Faruk Aydın Muhammet Serdar Nazlı F. Boray Tek Yasemin Turkan	913 - 918
2178		Segmentation Based Classification of Retinal Diseases in OCT Images	Öykü Eren F. Boray Tek Yasemin Turkan	919 - 924
2183		Unsupervised Translation from Shortwave Infrared Images to RGB Images: A Comparative Evaluation	Duygu Tasbas Hacer Yalim Keles	925 - 930
DSCI	1882	Automatic Segmentation of Time Series Data with PELT Algorithm for Predictive Maintenance in the Flat Steel Industry	Saygın Kaçar Tuğçe Ballı E. Fatih Yetkin	931 - 936
	1921	Otomobil Kredilerinde Temerrüt Tahmini ve Araç Geri Kazanım Olasılığı Analizi - Bir Segmentasyon Çalışması Default Prediction and Vehicle Recovery Probability Analysis in Auto Loans - A Segmentation Study	Sahin Nicat Anıl Ferdi Kaya	937 - 942
	1955	E-Ticaret Sadakat Programı Müşteri Eğilim Tahmini Customer Propensity Prediction in E-Commerce Loyalty Program	Yunus Emre Gündoğmuş Sinan Keçeci Ege Erdem Emre Rençberoğlu	943 - 946
	1967	Yapay Zeka ve Makroekonomik Göstergeler ile Tüzel Kredilerin Değerlendirilmesi Evaluation of Corporate Loans with Artificial Intelligence and Macroeconomic Indicators	Burak Yüksel Hakkı Berkay Çiçek	947 - 951
	1974	Enhanced Bot Detection on TwiBot-20 Dataset	Mehmet Ali Osman Atik Şevket Umud Çakır Alper Özcan	952 - 956
	1975	Drug-Drug and Drug-Protein Link Prediction on DTINet dataset	Mehmet Ali Osman Atik Yusuf Çelik Alper Özcan	957 - 960
	2029	Perakende Verilerinde Anomali Tespiti ve Döviz Kuru Älişkisi Üzerine ChatGPT Destekli Yorumlama	Şadi Evren Şeker	961 - 966

		ChatGPT Supported Interpretation on Anomaly Detection in Retail Data and Exchange Rate Relationship	Hatice Nizam-Özoğur	
	2033	Text to SQL Transformation Using LLM: a Comparative Research of T5, Seq2Seq, and SQLNet Models	Zhazira Shaikhiyeva Madina Mansurova Gulshat Amirkhanova	967 - 972
	2076	Sağlık Sigortası Sahiplerinin Davranışsal Analizi ve Kümelenmesi Clustering and Behavioral Analysis of Health Insurance Owners	Omer Sezer Koyuncu Seçil Arslan	973 - 978
	2087	On symbolic Prediction of Time Series for Predictive Maintenance Based on SAX-LSTM	Aykut Güler Tuğçe Ballı E. Fatih Yetkin	979 - 983
	2135	Profiling Driver Behaviors Using AI-Based Methods and Deep Learning Techniques for Improving Road Safety: A Comparative Study of Algorithms	Volkan Oban Mustafa Kaya Güzide Safi İrem Nur Çimen Tubanur Çatak Bulut Karadağ Gökhan Gümüş Aslıhan Çandır Fatih Alagöz	984 - 989
IR	1896	ReRag: A New Architecture for Reducing the Hallucination by Retrieval-Augmented Generation	Robin Koç Mustafa Kağan Gürkan Fatoş T. Yarman Vural	990 - 994
	1941	Enhancing Object Detection in Aerial Images Using Transformer-Based Super-Resolution	Aslan Ahmet Haykır İlkay Öksüz	995 - 1000
NET	1985	Proof of Concept Implementation for RSVP TSN Control Plane	Necip Gozuacik	1001 - 1004
	2100	Integrating Blockchain and SDN for Centrality-Aware Virtual Multicast Tree Embedding	Furkan Ayaz Evrin Guler Murat Karakus Davut Hanbay	1005 - 1010
	1969	QoS Aware Routing Approaches in Software Defined Smart Grids	Sedef Demirci	1011 - 1016
	2008	Deep Reinforcement Learning Routing in Mobile Networks	Arif Burak Dikmen Hasari Çelebi	1017 - 1022
RBOT	1942	Endüstriyel Robotik Sistemlerin Güvenlik Doğrulaması Safety Verification of Industrial Robotic Systems	Fatih Furkan Arslan Metin Özkan	1023 - 1028
	2077	EKF Based Localization: Integrating IMU and LiDAR Data in the Hilti SLAM Challenge	Behice Bakır Havvanur Bozömeroğlu Ebu Yusuf Güven	1029 - 1034
SING	1965	Communication (Educational) Kit (HaKi)	Murat Sever Utku Bilgin	1035 - 1038
	2089	Manyetik Parçacık Görüntülemeye Sistem Matrisi için Farklı Dalgacık Dönüşümlerinin Seyreklik Seviyesi Karşılaştırması Sparsity Level Comparison of Different Wavelet Transforms for the System Matrix in Magnetic Particle Imaging	Vildan Atalay Aydın	1039 - 1043
	2097	Sparse Channel Estimation For M-QAM-Based Underwater Acoustic Communication Systems	Mhd Tahsin Altabbaa Berkay Tekat Emin Tarik Iseri	1044 - 1048
OTH	1858	The 80/20 Principle in Morphemics-Morphology in the Educational Corpus of the Uzbek Language	Shahlo Khamroeva Bakhtiyor Mengliyev Muyassar Kholova	1049 - 1052
	1904	Gamification as a Tool for Personalized Learning in Inclusive Education	Dilaram Baumuratova Tamara Zhukabayeva Mira Rakhimzhanova	1053 - 1058
	1918	A Metaheuristic Algorithm for the Fixed Charge Transportation Problem	Nermin Kartli	1059 - 1062
	2027	Eğitimde Sürükleyici Teknolojilerin Kullanılması Fırsatlar ve Beklentiler	Atamuratov Rasuljon Kadirjanovich Majidova Gulhayo Abdirazzoq qızı Bayjonov Furqat Baxramovich Ongarov Mansurbek Bayrambekovich	1063 - 1068

			Saydullayev Zafar Erkinovich	
	2103	Bilgisayar Mühendisliği Öğrencilerinin Perspektifinden Bilişim Hukukunun Güncel Sorunları ve Çözüm Önerileri Current Challenges and Solution Proposals in IT Law from the Perspective of Computer Engineering Students	Sevda Bora Çınar	1069 - 1075
	2200	A Comparison of shcU-Net Based GAN and U-net Based GAN in Adult Dental Segmentation	Gürdal Altundağ Hakan Öcal	1075 - 1080
	1932	Leveraging Quantum Computing and Optimization to Estimate Financial Crashes in Small and Medium-Sized Enterprises	Ege Dincer Berkay Coskuner Ege Bilaloglu Bilge Koroglu	1081 - 1086
SW	1859	Investigating The Adoption of International Software Quality Standards in Turkey: A Comprehensive Analysis	Sevgi Koyuncu Tunç	1087 - 1093
	1886	Development of the Functional Structure of the Science and Education Information System	Dauletov Adilbek Yusupbayevich Matyakubova Noila Shakirjanovna	1094 - 1098
	1892	React ve Preact Javascript Çerçevesinde Karşılaştırmalı Analiz Comparative Analysis on React and Preact Javascript Frameworks	Muhammed Furkan Uygur Nesibe Yalçın	1099 - 1104
	1917	CAGE: A Tool for Code Assessment and Grading	Ümit Kanoğlu Oğuz Kerem Yıldız Hasan Sözer Olca Taner Yıldız	1115 - 1110
	1957	Extracting Driving Styles from Automotive Sensor Data to Develop Personas	M. Cagri Kaya Tayssir Bouraffa Krzysztof Wnuk	1111 - 1114
	1962	Lojistik Sipariş Dağıtım Entegrasyonu Sürecinde Sipariş Geri Çağırma Süreci Tasarımı ve Yazılım Geliştirilmesi Design and Software Development of The Order Recall Progress in The Logistics Order Distribution Integration Process	İklim Barman Ersin Şengül	1115 - 1120
	2009	The Dimension of Green Coding in Software Quality Control Processes	Volkan Abur	1121 - 1126
	2055	Are We Asking the Right Questions to ChatGPT for Learning Software Design Patterns?	Çağdaş Evren Gerede	1127 - 1132
	2060	Optimizing LLVM IR: Transforming Multiplication to Addition for Enhanced Execution Efficiency	Huseyin Karacalı Efecan Cebel Nevzat Donum	1133 - 1138
	2080	Estimation of Software Integration Test Duration via UML Statecharts	Fehim Göler Tolga Ovatman	1139 - 1144
	2093	DIA4M: A Tool to Streamline DevOps Processes of Distributed Cloud-Native Systems	Eren Tarak H. Hakan Kilinc	1145 - 1150
	2111	Software Industry Perception of Academic Collaboration	Deniz Akdur	1151 - 1156
	2139	Görüntü İşlemeyle Doğrulama Robotik Test Otomasyon Kullanımı: POS Cihazları Üzerine Uygulama	Miraç Emektar Harun Kadioğlu Ahmet Efendioğlu Fatih Mehmet Harmancı	1157 - 1161
	2141	VoIP Sistemlerinde Zihin Haritası Tabanlı Test Stratejiler : SIP Pbx Ürünü Üzerine Bir İnceleme Mind Map-Based Testing Strategies in VoIP Systems: A Case Study on SIP Pbx Products	Miraç Emektar Furkan Günaydın Fatih Mehmet Harmancı	1162 - 1167
	2173	A Robust Microservices Framework for Indoor Tracking System Development	Gafur Hayyrbayev Kerem Küçük Mahmut Çavur	1168 - 1172
DM	1927	Unsupervised Pattern Extraction of Time Series Data for Energy Disaggregation	Şirin Azazi Deveci Melih Günay	1173 - 1178
	1944	Topic Modeling Enhanced Tripartite Graph for Recommendation using Metapaths	Yaren Yılmaz Irem İşlek Şule Gündüz Öğüdücü	1179 - 1184
	1948	Community Detection on Software Library Dependency Graphs using Graph Neural Networks	Şevket Umur Çakır	1185 - 1190

			Mehmet Ali Osman Atik Ümit Deniz Uluşar	
	2190	Enhancing Mesh and Point Cloud Similarity Detection through Geometric Features and ICP	Talha Rehman Abid Mehtap Öklü Cem Yıldız Ali Erman Erten Kamer Kaya	1191 - 1196
	2214	Comparative Analysis and Practical Implementation of Machine Learning Algorithms for Phishing Website Detection	Samad Najjar-Ghabel Shamim Yousefi Payam Habibi	1197 - 1202
	2215	A Technical Analysis and Practical Implementation of Machine Learning Algorithms for Predicting Survival in Breast Cancer Patients	Shamim Yousefi Samad Najjar-Ghabel Hamidreza Shafaei	1203 - 1208
BIG	1881	Comparison Between Time Series and Relational Databases	Alpar Türkoğlu Onurcan Ersen Ibrahim Onuralp Yiğit Dincer Unal Hatice Golcuk	1209 - 1212
	1930	A Performance Evaluation Study on a Data Analytics Platform for Emergency Calls	Engin Yakar H. Hakan Kilinc	1213 - 1218
	2079	Adaptive Composite Market Volatility Index (CMVI) for Enhanced Stock Price Forecasting	Rabia Çevik Uğur Barış Özyürek Ali Kanal Vael Kokach Büşra Kocaçınar Oznur Şengel Fatma Patlar Akbulut	1219 - 1223
	2142	Hybrid Deep Learning Framework for Stock Price Prediction Incorporating Technical and Macroeconomic Indicators	Ali Can Turan Vael Kokach Büşra Kocaçınar Oznur Şengel Fatma Patlar Akbulut	1224 - 1228
	2125	Emotion-Aware Multimodal Biometric Identification by using Biosignals	Yekta Said Can Beyzanur Bektan Fatih Alagöz	1229 - 1235
	1854	Özbekçe-Türkçe Otomatik Çeviri Yazılımı için Deyimlerin Veritabanını Teşkil Etmede Karşılaşılan Güçlükler Automatic Translation Software Difficulties in Organizing the Database of Idioms for Uzbek and Turkish	Manzura Abjalova Umida Raşidova Eşref Adalı	1236 - 1240
	2028	Reversible Steganographic System for the Transmission of Personal Medical Data	Elmira Daiyrbayeva Ekaterina Merzlyakova Aigerim Yerimbetova Aigul Mukhitova	1241 - 1246

Database of Grammatical Form and Meaning Correspondence for Uzbek-English Translation Software

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Abstract. Creating a perfect Uzbek-English machine translation requires creating a perfect translation of grammatical forms in these languages. In this article, we analyze the units that we consider auxiliary words in the Uzbek language from a grammatical point of view, and several methods of their use in translation programs are proposed. The main focus of the research work is on the modeling of language units. The works of the world and Uzbek linguists dedicated to the modeling of language units were studied, and based on them, each grammatical meaning expressed by auxiliary words was approached individually.

Keywords: machine translation, grammatical form, grammatical meaning, auxiliary language units, modeling, encoding-decoding, equivalence.

I. INTRODUCTION

The issue of classification of words in languages is of special importance. Because in this way concrete grammatical meaning, function and categorical features of the word are revealed. For this reason, from the earliest periods of linguistics, scientists have been paying attention to the issue of categorization of language units. However, it should also be noted that the perfect classification of units in many languages remains one of the main problems of linguistics. In particular, language units in the Uzbek language are classified according to three principles: lexical-semantic, syntactic and morphologic [1]. We based our research on the lexical-semantic classification of words. According to it, language units are divided into 3 groups:

1. Units with lexical meaning.
2. Units that refer to a concept.
3. Units that do not have a lexical meaning.

Grammatical form refers to words that do not have a lexical meaning, but express only a grammatical meaning. It follows that the object of our research is language units that refer to a concept and do not have a lexical meaning. It is possible to determine the amount of such units in the Uzbek language. The problem is translating them into English. Because one form can express several grammatical meanings. The main task of our research is to create a perfect set of

grammatical forms in these two languages in English-Uzbek translator programs. In this article, problems of machine translation of Uzbek grammatical forms called connecting, auxiliary, predicate into English, cases of compatibility and incompatibility of grammatical form and grammatical meaning and ways to overcome these problems are shown.

II. LITERATURE REVIEW

The term morphological analysis used in traditional linguistics and the concepts of morphological analysis in the field of computational linguistics are not the same. In theoretical linguistics, morphological analysis means only the study of word form, while in applied linguistics, morphological analysis is a procedure that can be obtained from the form or appearance of information about different levels of the linguistic structure to convert into a structure, and the unit of morphological analysis is the word form into which the text is divided [2].

Morphological structure is a sequence of morphological structures of word forms included in the text, and these elements are arranged in the same order as the corresponding word forms in the text.

Comparing units that do not have a common lexical meaning in Uzbek and English, we refer to the grammar of these two languages. When analyzing word groups in machine translation, the following must be taken into account:

1. to identify the similarities of grammatical categories existing in both languages;
2. coordination of mutually different categories in both languages;
3. similar modeling of both groups above [3].

Studies on linguistic typology and comparative analysis of languages are considered in the aspect of generative linguistics. Language modeling for a computer base is the most convenient learning method. Computer morphology is necessary for high-level applications, so modeling within morphology is used in many studies [4]. In particular, at Carnegie Mellon University, M. Raab defended his thesis entitled "Language modeling techniques for machine

translation". Various methods of language modeling, comments on created language models, practical research of the researcher, results and conclusions are included in the research work [5]. University of Haifa scientists Gennady Lembersky, Noam Ordan, Shuly Wintner study the difference between language models built from original texts in the target language and language models built from texts manually translated into the target language. In this way, they propose to create language models for machine translation [6]. Research works are being carried out within the framework of machine translation in Turkish languages as well. Turkish scientists are conducting research on Turkish interlanguage and Turkish-English machine translation. For example, many scientists such as A.C. Tantuğ [7], Z. Sagay [8], I. Hamzao'glu [9], K. Altintash [10], M. Orhun can be listed. For example, in M. Orhun's research work entitled "Machine translation between uygur language and turkish", models of Turkish and Uyghur language units are created and compared [11].

In Uzbek computer linguistics, much attention is paid to modeling today. Because it is confirmed that it solves many problems of today's NLP. For this reason, scientific research work on modeling different levels of the language is being carried out. In particular, in this regard, B. Elov [12], N. Abdurahmonova, Sh. Hamroyeva [13], S. Bozorova [14], S. Muhammedova [15], S. Khudayarova [16], M. Suyunova [17] can be listed. They offer different ways of modeling language units in their work. In particular, models of simple Uzbek-English sentences for machine translation were developed and compared by N. Abdurahmonova. Sh. Hamroyeva's doctoral dissertation is devoted to the modeling of grammatical forms for the morphoanalyzer of the Uzbek language. And B. Elov offers a hidden dirixle method of modeling language corpus texts. S. Bozorova offers methods of syntactic analysis based on free context grammar and models Uzbek word combinations. M. Suyunova is engaged in modeling grammatical homonyms in the Uzbek language, and S. Khudayarova is engaged in modeling word combinations.

In morphological modeling, it is important to give a correct and precise linguistic description. The correctness of the morphological criteria is checked in the following stages:

1. analysis of only correctly formed grammatical word forms;
2. how to determine grammatically incorrect word forms [11].

The correctness of word forms is determined only from the models that are found to be correct, and the remaining cases confirm its incorrectness.

In Uzbek, conjunctions, auxiliaries and prepositions, which are generalized as auxiliary language units, have a specific form in Uzbek and appear in English through several different means. In this case, cases of mismatch between grammatical form and grammatical meaning are observed, namely, situations such as grammatical polysemy, homonymy, and synonymy appear. Such language phenomena affect the quality of translation in machine translation.

In this direction, the importance of rule-based, namely, grammatical analysis is that the analysis is consistent with linguistic phenomena of polysemy and homonymy, and another aspect is the separate study of different categories in languages belonging to different types [12].

Two types of algorithms are used to improve the quality of morphological analysis in the process of identifying a set of ambiguous words: statistical-probabilistic and rules governing words/codes.

In order to implement a perfect machine translation of Uzbek-English grammatical forms, it is necessary to create a linguistic database that takes into account linguistic phenomena. Below we will consider this model of linguistic support.

Solving the problems of synonymy, homonymy, polysemy encountered in grammatical forms requires the creation of a separate linguistic database for each case.

III. POLYSEMY IN GRAMMATICAL FORMS

Multiple meanings of a word is an independent system in language, and this phenomenon is called polysemy in general linguistics. The word was originally used for one meaning, but through the passage of time and various linguistic influences, it has several meanings. Polysemy is distinguished from other phenomena by the fact that it consists of lexical meanings within a category, their interdependence, and the fact that the meanings belong to the same word itself [13]. For example,

Uxlasin deb qo'shiq aytib berdim(1).

Tanimaydi deb salom bermadim (2).

In both languages, the word deb has a grammatical meaning, but there is a difference in meaning. In the first example, the word deb expresses the meaning of the goal, and in the second, it expresses the reason. In English, they are equivalent to two words.

I sang a song for him *to* sleep(1).

I didn't say hello *because* I didn't know him(2).

In the first sentence, the word "deb" is translated as "to" and "because" in the second sentence.

It is important to fully reflect their grammatical meaning when creating the linguistic support of auxiliaries belonging to a group.

Although grammatical forms do not have a lexical meaning, their grammatical meaning and function is realized in the speech process. For this reason, it is not correct to consider them as a morphological form separated from speech.

In world and Uzbek linguistics, several theories have been developed to solve the problems of lexical polysemy, homonymy and synonymy. In a sense, they partially solved the problem. However, this is still not enough. Perfect machine translation mechanisms have not yet been developed. Studying the opinions and theories of world scientists and drawing conclusions from them, we would like to propose several ways to solve the problem of inconsistency of grammatical form and grammatical meaning.

A. Method 1 – the encoding method.

The linguistic support base is aimed at explaining such words and clarifying their meaning. It contains all the grammatical meanings of a word. The meanings represented by conjunctions, auxiliaries, and prepositions are coded to translate these grammatical forms into machine language and determine the English equivalent. A separate code is given for each grammatical meaning. The general ID number of a

morphological tool is equal to the codes represented by the grammatical meanings in it.

The first character in the code of the morphological form is its grammatical category ((bog'lovchi – B, ko'makchi – K, yuklama – Y), if the language unit we are studying does not

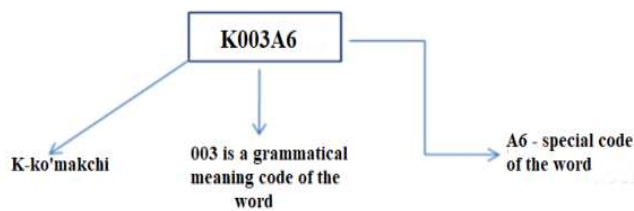


Fig.1. Encoding a word with one grammatical meaning

Some units work together in two different categories. A conditional sign of both categories is included in the coding. For example, the code of the word “bo'yicha” is K4567F9. See figure 2.

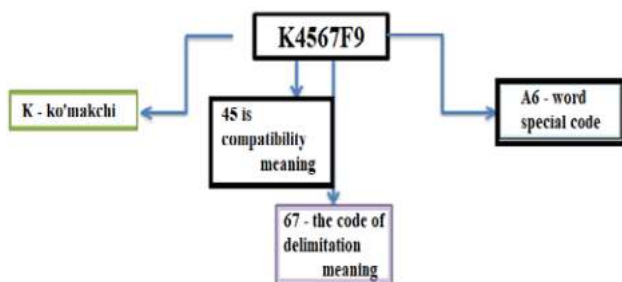


Fig.2. Encoding a word with multiple grammatical meanings

have polysemous features, the next three characters are the code of its grammatical meanings, the next two characters represent the special code of the word. If the auxiliary language unit has several grammatical schemes, a two-character code is given for each scheme. For example, the atab assistant will have the ID number K003A6.

Some units work together in two different categories. A conditional sign of both categories is included in the coding. For example, the code of the word “ham” is YB-056308A4. This is given in figure 3.

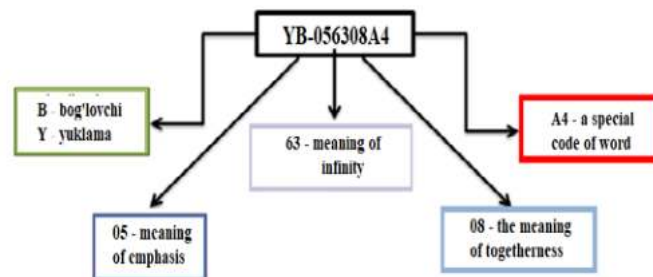


Fig. 3. Coding the word within two different categories

The grammatical meanings of auxiliary language units in the Uzbek language have the following conditional sign. See Table I.

TABLE I. SPECIFIC GRAMMATICAL MEANINGS OF AUXILIARY WORDS

definition	001	strengthening	038
amount, measure	002	exaggeration	039
designation	003	reason	040
subtraction	004	result	041
highlight	005	target	042
gallic	006	contradiction	043
sequence	007	selection	044
togetherness	008	compatibility, proportion	045
cooperation	009	compatibility	046
expressing togetherness	010	exception	047
connection	011	uncertainty	048
emotion	012	place	049
surprise	013	demarcation relative to place	050
scaring	014	time	051
topic of thought	015	analogy	052
suspicion, guess	016	comparison	053
the object that is the basis for the action	017	clarifying on the basis of comparison	054
direction	018	mixing	055
manner of performance of action	019	compare	056
the occurrence of movement along a certain place	020	weapon, tool	057
occurrence of the action for a certain period of time	021	something that is a tool for action	058
action start time	022	a place that is instrumental in the occurrence of action	059
the initial place in the occurrence of the action	023	equality	060
the initial source of action	024	speed	061
duration of action	025	used in relation to a sudden action	062
that only one of the two actions takes place	026	barrier	063
that neither of the two actions takes place	027	surprise, amazement	064
completion of action	028	condition	065
lack of activity	029	generalization	066
time before action	030	limitation	067
level of activity	031	limitation in relation to time	068
past tense	032	demarcation relative to place	069
present tense	033		
future tense	034		
question	035		
command	036		
desire	037		

On the same basis, special codes of grammatical forms in English are created. They are compared and the

proportionality of grammatical forms is determined in percentages.

The difference of this method from other encoding-decoding, comparison-contrast methods is that it emphasizes the dominance of one language. That is, the language that is relatively more complex and has more exceptions is taken as dominant. Units of a second language are considered separate units, detached from the grammatical rules of that language. Separate units of the second language are analyzed based on the rules of the dominant language. In our research, the Uzbek language was taken as the main criterion. English words are analyzed based on Uzbek grammar. This method gives us the following advantages:

1. Eliminates inter-category differences. Since we are dealing with the grammatical meanings of words, we cannot avoid the issue of their categorization. The border of independent and non-independent units in English differs from that in Uzbek. Therefore, it is necessary to bring them together.
2. Facilitates unit modeling. Allows both languages to use the same encoding method.
3. The modeling of words in English is the same as in Uzbek. See figure 4.

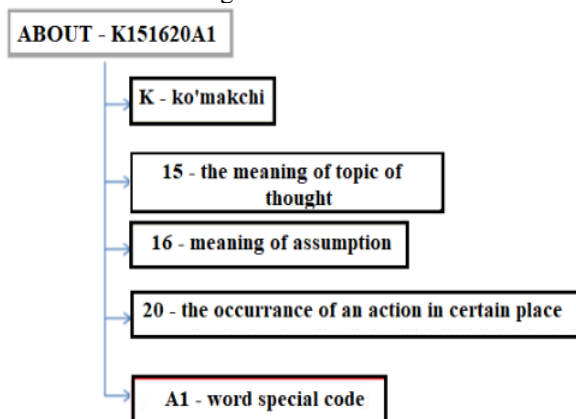


Fig.4. Encoding a word with multiple grammatical meanings in English.

The results are compared.

B. Method 2. Encoding each form and meaning separately.

This method is a logical continuation of the first method. The difference is that in this method, a separate code is given for each meaning of a specific language unit. Each grammatical meaning and the grammatical form representing it are given a separate place in linguistic support. For example, the word with has five grammatical meanings: togetherness, cooperation; condition; unobstructed; time, tool. They are reflected in the linguistic base as shown in Table II.

TABLE II. GIVING THE WORD FORM IN THE LINGUISTIC BASE.

Id	Word formative	Word classes	Grammatical meaning	Examble
B-010008	bilan	Conjunction	Cooperation	Doim birga kuylaymiz do'stim bilan men
K-010051	bilan	Auxillary	Time	Qo'ng'iroq chalinishi bilan dars boshlandi
K-010019	bilan	Auxillary	Condition	Alam bilan kuyladi
K-010063	bilan	Auxillary	Unobstructed	Aytganim bilan baribir kelmaydi
K-010057	bilan	Auxillary	Tool	Qalam bilan yozdi

In this case, the first character represents the general grammatical meaning of the word, namely the category of the word, the next three characters represent the special code of the word, and the last three characters represent its grammatical meaning. Given in figure 5.

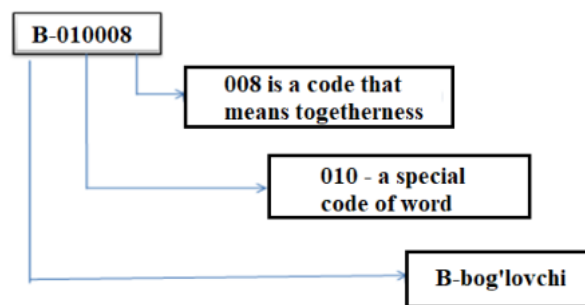


Fig.5. Encoding only one meaning of a word.

A similar database of code words is created in English. Units that correspond to each other are considered compatible. See table III.

TABLE III. THE APPEARANCE OF THE ENGLISH ALTERNATIVE OF THE WORD IN THE LINGUISTIC DATABASE

Id	Word formative	Examble
B-010008	And	My friend <i>and</i> I always sing together
K-010051	As soon as	<i>As soon as</i> the bell rang, the lesson began
K-010019	With/ -	He sang <i>with</i> pain
K-010063	Even if	<i>Even if</i> I say him, he will not come
K-010057	With	He wrote <i>with</i> a pen

IV. CONCLUSION

The following conclusions were drawn from the study:

1. Unlike lexical units, grammatical forms can be analyzed on the basis of certain forms. Because their meanings are limited.
2. When comparing morphologically different languages, the units of one language can be reduced to the grammatical criteria of the second language. This makes them easier to understand.
3. Analyzing words using the modeling method in grammatical forms gives good results.

Thus, the concept of morphological analysis was formed in applied linguistics and widely used in machine translation. The concept of morphological analysis is an operational concept, if in traditional linguistics it includes only the description of word forms and "what is classified?" to answer the question, in computer linguistics it is not important, but the main attention is focused on how to get this or that information from the word form in the text. However, these two areas cannot be separated from each other. Because computational linguistics is based on theoretical linguistics.

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