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THE INTRODUCTION OF KAZAKH LANGUAGE TO THE "SYMPTOM CHECKER" SYSTEM

Abstract. This article studies the introduction of Kazakh language to the medical decision system called "Symptomchecker". As a solution, model of the medical decision system was recreated from medical support system ISABEL and was made by the methodology method**.** For selecting and showing the final diagnosis the dataset was translated from Russian language to Kazakh using Google Translate and the website: sozdik.kz. The aim of this research work is to create the medical support system for people with knowledge of Kazakh language who don't know other languages. The system was created in Android Studio for mobile devices. The user is displayed with a nitty gritty list of all conceivable symptoms seen in most of the commonly seen maladies overseen by self-care.

Keywords: language, dataset, methodology, self-care, symptoms.

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Introduction. One of the most important tasks of a full-fledged medical decision support system is to select assumptions about the presence of a particular disease in a patient based on the list of identified symptoms. A service that, based on the list of symptoms identified in a patient, determines the likelihood of a particular disease, is commonly called a "symptom checker". There are a lot of implementation of this idea in the world (Medical diagnostic systems such as Isabel, Symptomate, WebMD and others.), and some of them have been launched for a long time. Typically, such solutions are intended for use by patients - so that they can mark their symptoms and, with the help of this, get a list of possible diseases and then form recommendations on them, including routing the patient to the right medical organization or to the right specialist [1].

When the scope is broad (when it tries to analyze all the common, unprecedented and uncommon issues conceivable in all the therapeutic specialties) ordinarily the yield tends to be broad for self-evident reasons and befuddling for normal wellbeing proficient individual. It isn't unprecedented for a few side effect checkers to yield 50-100 infections in return for a given set of side effects. Most of the indication checkers are multi-specialty in center coming about in voluminous yields comprising diseases from dissimilar roots. However another imperative issue is the technique of the side effects checker assessment [2].

Whereas numerous endeavors have been committed to make strides health-care framework structures less consideration has been devoted to exploring examination strategies to back restorative applications. In several classifiers have been utilized for detecting sport exercises by analyzing 3-D accelerometer signals. Themain center was on comparing directed and unsupervised settings for movement acknowledgment. Be that as it may, real-time investigation and mobile handling, which are the center of this paper, are not addressed [3].

The utilize of IoT innovation alone can set up an information network that intercontinental clinics, communities, healthcaredevices, homes, and other terminals. Confronting with the tremendous information substance and extraordinary framework complexity, the network itself cannot give fast and successful restoration treatment [4].

The doctor within the wellbeing institution can calculate GFR from patient's blood creatinine, age, race, sex and other variables depending upon the sort of formal-recognized computation equations is utilized. The GFR may demonstrate how wellbeing of a patent's kidney and can moreover be taken to decide the organize of seriousness of a understanding with or without kidney malady [5].

An ML show require not be prepared for off-the-shelf, practice-changing execution to form a profitable commitment, but must accomplish a clear reason. The current SI incorporates reports on ML approaches that have experienced review approval and are presently prepared for planned testing, ML at early stages of approval, and head-to-head comparisons between standard epidemiological and ML approaches that recommend future bearings without themselves setting up clinical utility. The articles shift broadly within the planning application or "use cases" for their models. The creators were not attempting to challenge the standard of care, but to progress conclusion when asset imperatives or clinical signs make fragmentary stream save unreasonable or unacceptable [6].

But the main problem is that the creators of these applications added information only for their region. They didn't include our country to their system. For example, if person who knows only Kazakh language won't use it because he or she can't understand it.

System description. To approve the framework, it was chosen to compare the framework execution with that of ISABEL (Fig. 1). ISABEL is one of the exceptionally few frameworks approved and acknowledged as reasonably precise and dependable. Whereas ISABEL was at first planned to be utilized in healing center pediatric wards, afterward the setting of utilize was amplified to common Medication by the designers. Still afterward it was reported that a side effect checker form for patients as well had been outlined and created utilizing the same calculation utilized for the restorative experts. The current ponder utilized this adaptation for the approval of the MDTekser.

Figure 1. Isabel Symptom Checker

At first, users input (Figs. 2 and 3) the information about them: Age, Gender. In the output (Figs. 2 and 3) they can receive their exemplary diagnosis (result). Diagnosis may incorporate one or a few infection names. With the diagnosis, data on triage, treatment and take after up counsel as well is given. The capacities of the framework incorporate getting to the side effects board and selecting the indications, getting the diagnosis and counsel and at last sparing the information for afterward recovery. The execution necessities the symptom checker will meet are: to create a straightforward program to assist clients self-diagnose their indications, to have a versatile application with exceedingly centered usefulness and to output more significant data instead of instruction. Outside UI may be a single web page in as numerous gadgets as conceivable for input, a single web page for output in as numerous gadgets as conceivable, holding the reasoning mechanism at the server doing its work. The output is additionally arranged to be spared in a database on future forms. Clients are expected to associated with the framework through a web browser employing a mobile device. The individual encounter of the indications could be a necessity for the ordinary utilize of the framework. The user is displayed with a nitty gritty list of all conceivable symptoms seen in most of the commonly seen maladies overseen by self-care. The output for the user is made more noteworthy than referral for more data.

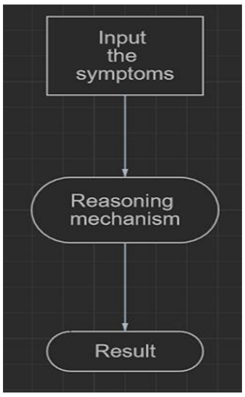


Figure 2. Scheme

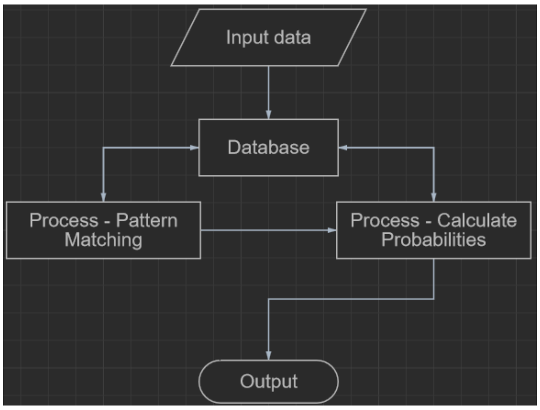
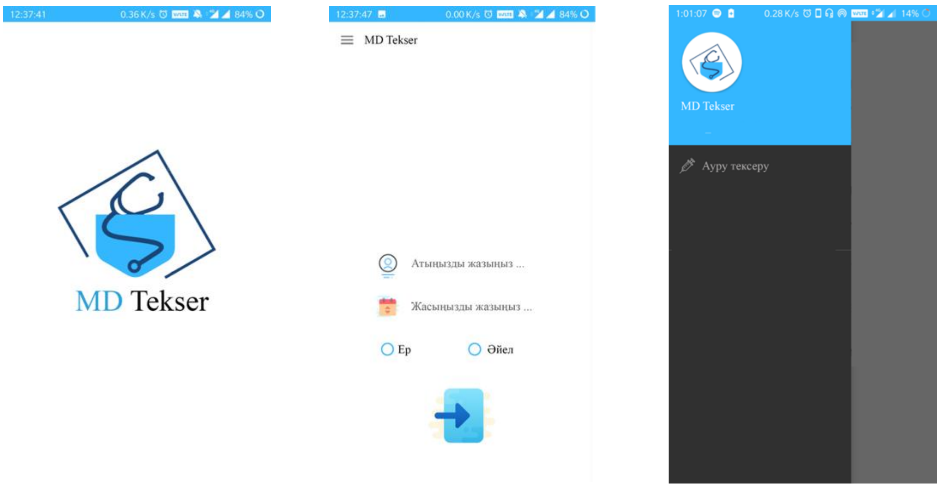


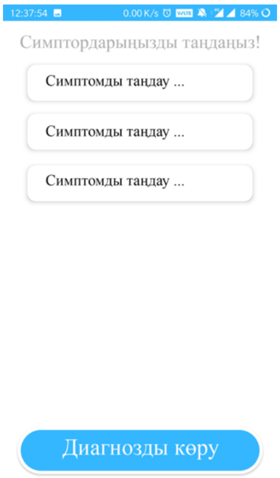
Figure 3. Input – Output

The client mistakes related to program usefulness is nearly negligible. But the blunders are anticipated within the yield when the yield comprises of no determination or conclusion with very low probabilities. This is often of course appeared to the client in clear terms and the client can rerun the program for superior yield with input more adjusted with the information passage rules. Outputs with no determination or conclusion with exceptionally moo probabilities within the extend of 25 percent or underneath can be due to numerous reasons. To begin with the malady may not be within the framework information base. Moment the illness is show, but the moo likelihood may be due to the information passage being not agreeing to the information section rules. The other major mistake anticipated is the unseemly client and improper setting. Improper client is any client who isn't anticipated to be the client of the framework. Improper setting is the wellbeing care setting this framework is anticipated to work. The fitting setting for the framework to be operational is the community. It isn't to be utilized by people who are as of now within the auxiliary or tertiary wellbeing care levels (healing center wards, having clear therapeutic determination, beneath treatment from healing center clinics etc.). Indeed beneath these circumstances, the chance of computer program disappointment is for all intents and purposes zero as there will continuously be an yield in case more than 2 indications were input from the input board.

The prototype of the mobile app. The first step was downloading the symptoms and diagnosis data from website to Excel file. Translated the data from Russian to English, using the Google translate and sozdik.kz. The second step: To create the mobile application was used Android Studio. This app is consist of 5 frames (windows): Welcome Screen, Home Screen, Navigation Tab, Symptoms Screen, Diagnosis Screen (Fig. 4). There can be navigated with navigational buttons. Welcome Screen shows the logo of the program. Home Screen is where user should to fill the information about him: Name, Age. In the Navigation Tab user can see in which window he/she located. After filling information user go to the next frame called Symptoms Screen. There are user can select the symptoms. And final result will be shown in Diagnosis screen with causes and prevention. For experiment user selected 3 symptoms: dizziness, heartache, dyspnea. As a result we received the final diagnosis (cardio- vascular disease) on Diagnosis Screen.



a) b) c)



d)

e)

Figure 4. a) Welcome Screen, b) Home Screen, c) Navigation Tab, d) Symptoms, e) Diagnosis

Validation methodology – Sampling, Statistics. Validating an analytical method establishes that the procedure will produce dependable and repeatable findings regardless of time or who executes it. It demonstrates that the approach is appropriate for the task at hand.

When a new technique is formed and is meant to become a commonly used measurement, when features of the practical performance have changed, or when the method is planned to be used at a different location, a method validation is required. Method transfers are one example of this. Furthermore, all analytical procedures intended for use in a pharmaceutical laboratory for quality control, as well as those used for cleaning validation or environmental monitoring, must be validated before being employed for the first time.

One hundred scenarios were interpreted. It concludes patient's medical records. The sensitivity, specificity, positive, and negative predictive values were calculated using the 2×2 contingency table during validation. The contingency table was created with ISABEL-based columns and MDTekser-based rows. First, it was examined whether each system generated a diagnosis with a reasonable likelihood. The systems were then compared to the other program output to see if they agreed on the diagnosis. For the purposes of this validation research, the ISABEL diagnosis was assumed to be accurate. The table may be found in Table 1.

Table 1

2 × 2 Contingency table for the diagnostic agreement

	ISABEL +	ISABEL -	TOTAL
MDTekser +	73[a]	4[c]	77
MDTekser -	22[b]	1[d]	23
TOTAL	95	5	100

Research results. The following diagnostic statistics were calculated using the standard definitions for specificity (d / c+d), sensitivity (a / a+b), accuracy (a + d / a+b+c+d), negative predictive value (d / b+d), positive predictive value (a / a+c).

The specificity was 45% with a 95% CI of 6.54% – 90%. The sensitivity was 81.37% with a 95% CI of 71.3% – 90%. The negative predictive value was 15.1% with a CI of 5.01% - 24.93% and the positive predictive value was 96.16% with a 95% CI of 92.45% - 98.05% and. The overall accuracy was 80.5% with a 95% CI of 70.03% - 87.33%.

The MDTekser is equivalent to the ISABEL symptom checker based on these results, notably sensitivity, positive predictive value, and accuracy. The values are extremely high, and the confidence intervals are quite small, indicating that the estimations are extremely precise. However, the specificity and NPV were too low and unreliable. There are a number of reasons for this, the most important of which being sample discrepancies.

The sample was thought to be representative of typical patients who needed to be admitted to hospital wards. Variations in sampling necessarily indicate discrepancies in disease incidence and prevalence in the subject population, and differences in prevalence and incidence are well known to result in low specificity estimates. Apart from that, the ISABEL research methodology clearly demonstrates yet another substantial sampling difference: the likelihood of including normal people in the sample. While this is mild in the author's sample, all of the ISABEL case vignettes appear to have pathology. The gold standard is yet another methodological difficulty. The accuracy of diagnosis was determined by simple agreement between the physicians' diagnosis and the symptom checker output in the current study, and it was the diagnosis by the study physicians in the ISABEL study, as case vignettes were developed by the physicians, and the accuracy of diagnosis was determined by simple agreement between the physicians' diagnosis and the symptom checker output in the ISABEL study. There was no attempt to calculate specificity. This is likely due to the fact that a high specificity is necessary to rule out illness in individuals who do not have pathology, while a high sensitivity is required to identify disease in those who do.

Conclusion. In this research the working of symptom checker was created using the existing medical support system called ISABEL. The system was created in Android Studio for mobile devices. The main purpose of this work is make a possibility to use the symptom checkers by Kazakh people. For selecting and showing the final diagnosis the dataset was translated from Russian language to Kazakh using Google Translate and the website: sozdik.kz. It is necessary to replenish the database of countries and link the system to this database so that it can be regularly updated. Need to come up with a simpler interface design. As a result, it is expected that the future symptom checker will spread widely to countries where people don’t have knowledge in taking medical care by themselves and will be included to the Neural Network.

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"СИМПТОМЧЕККЕР" ЖЕЛІСІНЕ ҚАЗАҚ ТІЛІН ЕНГІЗУ

Аңдатпа. Мақалада қазақ тілінде медициналық қолдау көрсету жүйесін құру үшін қазақ тілін "симптомчеккер" деп аталатын медициналық шешімдер қабылдау жүйесіне енгізу мәселесі қарастырылған. Негіз ретінде медициналық шешім қабылдау жүйесінің моделі болып табылатын ISABEL медициналық қолдау жүйесі қолданылды. Соңғы диагнозды таңдау және көрсету үшін Google Translate және sozdik.kz веб-сайттарының көмегімен деректер жиынтығы орыс тілінен қазақ тіліне аударылды. Жүйе мобильді құрылғыларға арналған Android Studio-да жасалды. Пайдаланушыға өзін-өзі күту кезінде жиі кездесетін аурулардың көпшілігінде байқалатын барлық симптомдардың егжей-тегжейлі тізімі көрсетіледі.

Тірек сөздер: тілі, ауру, деректер жиынтығы, өзін-өзі күту, симптомдар.

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ВНЕДРЕНИЕ КАЗАХСКОГО ЯЗЫКА В СИСТЕМУ "СИМПТОМЧЕККЕР"

Аннотация. В статье рассматривается внедрение казахского языка в систему принятия медицинских решений под названием “симптомчеккер” для ее создания на казахском языке. В качестве базы использована система медицинской поддержки ISABEL. Для выбора и отображения окончательного диагноза набор данных был переведен с русского языка на казахский с помощью Google Translate и веб-сайта: sozdik.kz. Система создана с помощью Android Studio для мобильных устройств. Пользователю отображается подробный список всех симптомов, наблюдаемых при большинстве часто встречающихся заболеваний.

Ключевые слова: язык, набор данных, методология, самообслуживание, симптомы.