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RESEARCH ARTICLE

FIVE QUESTIONNAIRE ALZHEIMER'S TEST WITH DATA MINING METHOD

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ABSTRACT

Alzheimer is a serious ilness which usually occurs over 65 years old people. The number of patients with this disease are very high in our country and the world. This disease begins as forgetfulness then extends up to an inability to perform daily activities and can be fatal if not treated within 7-8 years. In this study was conducted a study to be diagnosed with 5 data through 32 questions test data for patients suspected to be suffering from Alzheimer benefiting from data mining.

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INTRODUCTION

Alzheimer is a serious illness occurring over 65 years old people, observing a little more in women compared with men, showing up in every 15 people over 65 years old, and starting with forgetfulness and proceeding with problems such as memory difficulty, aphasia, and can not practicing the necessity of daily activities. Alzheimer illness can be resulted in death after 7-8 years of beginning if it's not treated (Benjamin, 2000; James, 2003; Pierre, 2004; Lars, 2007; http://www.e-psikiyatri.com/alzheimer-in-10-isareti-59353 and Kononenko, 1998). There are more than 300 thousand Alzheimer patients in our country and more than 30 millions Alzheimer patients in the world. Nevertheless, there is not a definite treatment for the illness. Factors causing Alzheimer illness are known as protein accumulation in brain, death of brain cells, deterioration of neural transmission, and dietary habits. Even though it's thought as genetic, it was observed that only 10% of illnesses are genetic, when families of person having this illness are investigated in conducted researches (Benjamin, 2000; James, 2003; Pierre, 2004; Lars, 2007; http://www.e-psikiyatri.com/alzheimer-in-10-isareti-59353 and http://www. Kononenko, 1998).

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Alzheimer diagnosis, treatment and precautions

Brain imaging, blood tests, and laboratory investigations are done for diagnosing Alzheimer. Visual effects such as forgetfulness, hurriedness state, being worried, stress etc. can help diagnosis (Benjamin, 2000; James, 2003; Pierre, 2004; Lars, 2007; http://www.e-psikiyatri.com/alzheimer-in-10-isareti-59353 and Kononenko, 1998). Since there is no certain treatment for Alzheimer, medicines like donepezil, rivastigmine, galantamine, acetylcolinesterase inhibitors and memantine are used to decelerate the progression of the illness and to decrease symptoms. The aims of this treatment are to increase the life quality of patient and to overcome emergent psychological problems. Therefore, it is very important to prevent Alzheimer illness before emerging, rather than after emerging, (Benjamin, 2000; James, 2003; Pierre, 2004; Lars, 2007; http://www.e-psikiyatri.com/alzheimer-in-10-isareti-59353 and http://www. e-psikiyatri.com/21-soruda-alzheimer-testi-29296 and Kononenko,1998).

Data Mining

Data mining is to fish out important data from big amount of data. Data mining arises on the purpose of analyzing data and reaching information by analyzing data (http://ab.org.tr/ab13/bildiri/175.pdf). Data warehouse is storages that combined data by taking from many databases are collected. Properties of data warehouse are to provide different detail levels to users. While the bottom level of detail is related to

archived records, higher levels is related to collect more information such as time (Murray, 1999). Data warehouse is a system, from health sector to informatics sector and from marketing to product section of businesses, to make predictions about future, to make deductions and to define management strategies of businesses (http://ab.org.tr/ab13/bildiri/175.pdf). Kusiak *et al*. performed a decision support study about whether the tumor in lung is benign or malignant. Statistics show that there are more than 160 thousand lung cancer cases and it's determined that 90% of them resulted in death. In this context, early and accurate diagnosis of this tumor becomes important (Kusiak, 2000). There are also health studies performed with data mining on the subjects of prostate cancer (Hu, 2013), anemia (Sebastiani, 2005), nasopharynx (Galan, 2002), and clinical medical information (Riccardo Bellazzi, 2008; Igor, 2001; Paul, 2006; Krzysztof, 2002). In this study, A test consisting of 5 questions about Alzheimer was degraded from over 22 questions, as well.

Alzheimer tests

According to Muftuoglu, 2016, ten signs of Alzheimer were indicated as following:

- Progressive memory loss
- Difficulty in daily activities.
- Forgetting words.
- Confusing time and place
- Impaired judgment
- Passing a passive life
- Sudden changes in personality
- Losing stuff
- Behavioral changes
- Not be thinking fast and serial (http://www.e-psikiyatri.com/alzheimer-in-10-isareti-59353)

The following 21 questions tests, which its answer will be yes or no, are also performed to patients and relatives for diagnosing Alzheimer;

1) Does your relative have memory loss?
2) If yes, his/her memory is worse than that was a few years ago.
3) Does he/she repeat questions, statements and stories during the day?
4) Do you track his/her activities or appointments?, does he/she forget himself/herself?
5) Does he/she confuse place of his/her stuff more than a month?
6) Does he/she blame other people to steal or hide the stuff when he/she cannot find them.
7) Does he/she have trouble to remember the day, the month, and the year? Does he/she check them more than once a day?
8) Does he/she go astray in a place which he/she doesn't know?
9) Is his/her mind confusing when he/she is not at home or he/she is on a trip?
10) Does he/she have problem to calculate when he/she tips or gets change?
11) Does he/she have problem to pay bill or to make budget?
12) Does he/she forget to take medicine or to keep record of medicines taken?
13) Does he/she have trouble in driving or do you have such a concern?
14) Does he/she have problem with using tools such as stove, phone, remote control, and microwave?
15) Does he/she have trouble doing housework or home repair except physical situations?
16) Does he/she quit or decrease activities such as golf, dance, and exercise except physical situations?
17) Does he/she loss his/her way that he/she already knows?
18) Does he/she loss sense of direction?
19) Does he/she have trouble in finding words?
20) Does he/she confuse his/her relatives' or friends' names?
21) Does he/she have trouble to recognize his/her family members? (http://www.e-psikiyatri.com/21-soruda-alzheimer-testi-29296).

EXPERIMENTAL METHODS

In this study, five questionnaire decision tree (Figure 1) and decision rules were created based on a 32 point data (Table 1) by considering 65 years old limit, 21 questions that are used in tests and 10 signs which are indicated as Alzheimer sign. By removing first question, a 4 point questionnaire decision tree and creating rules can be also applied for patients under 65 years old.

Figure 1. Five-questionnaire decision tree

Rule 1: If under 65 years old;
Risk: low
Rule 2: If over 65 years old and no forgetfulness;
Risk: close to low
Rule 3: If over 65 years old, have forgetfulness and not searching key, glasses etc.;
Risk: close to medium
Rule 4: If over 65 years old, have forgetfulness, have searching key, glasses etc., and no stress;
Risk: medium
Rule 5: If over 65 years old, have forgetfulness, have searching key, glasses etc., have stress, and no hurriedness;
Risk: close to high
Rule 6: If over 65 years old, have forgetfulness, have searching key, glasses etc., have stress, and have hurriedness;
Risk: high

Table 1. Education Data

H	1	2	3	4	5	R
X	YES	YES	YES	YES	YES	HIGH
Y	YES	YES	YES	YES	NO	MEDIUM
Z	YES	YES	YES	NO	NO	MEDIUM
T	YES	YES	NO	NO	NO	LOW
U	YES	NO	NO	NO	NO	LOW

1) 65 Years old 2) Forgetfulness
3) Searching key, Glasses
4) Stress 5) Hurriedness
H) Patient R) Risk

Classifier model that is taken according to the education data in Table 1 is as following:

If 1=Y and 2=Y and 3=Y and 4=Y and 5=Y Risk= High
If 1=Y and 2=Y and 3=Y and 4=Y Risk= Medium
If 1=Y and 2=Y and 3=Y Risk= Medium
If 1=Y and 2=Y Risk= Low
If 1=Y Risk= Low

RESULT AND DISCUSSION

Even if Alzheimer illness is generally seen over 65 years old people, it can also be showed up under 65 years old people as is due standard of living. Diagnosis of Alzheimer can been late while it is a serious illness that starts with forgetfulness, continuing to not practicing daily activities and causing to death within 7-8 years. There are 10 signs as Alzheimer illness indication and there are 21 questions tests that are applied to patient or his/her relative for diagnosing Alzheimer. In this work, 5 questionnaire decision tree and proper rules to this, education data, and classifier model was created based on 32 questions and signs by adding 65 years old, as well. This model is a model to diagnose. By removing 65 years old data, it also enables to be applied under 65 years old patients with performing same procedures over 4 questions.

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