

What is Medical Knowledge Base?

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Dear colleagues, my greetings!

Let's speak about Medical Database. What is it? Let's see in Google. There are many names of it there. For example:

- 1) Databases of publications in scientific journals and patents;
- 2) Database of patients;
- 3) Database of doctors;
- 4) Database of medical records;
- 5) Data base of medical facilities. And so on...

Also, different countries have different names or abbreviations of the medical data bases. But I would like to make a short review of the medical database of the diseases and symptoms and to define what exactly this is.

And so 1991. A Ukrainian hospital first has got personal computers. The purpose was to make some kind of automatization of doctors' offices. My task was to create a software for doctor proctologist with medical record and description of colonoscopy. There wasn't "Windows 1.0" that time in Ukraine. And we used DOS. I have developed Software Requirement Specifications (SRS). Briefly: Layouts of Medical Records; database of patient's data; data base of medical records; database of findings of colonoscopy; database of diseases of proctology and colon and their symptoms; algorithms. Later on I combined database of colonoscopy and proctology.

To avoid confusion in definitions of medical databases, I introduce the term "Knowledge Base" for all diseases of all medical sciences and their symptoms for the first time.

And how to call the algorithm that determines the name of the disease in the knowledge base by the sum of likelihoods of the entered symptoms? And then I introduce the concept and the term of "Algorithm of Syndromic Diagnosis" for the first time.

And what is the knowledge base doing in this software? Knowledge base calculates probabilities of diagnosis and gives a hint to a doctor what kind of diseases the patient may have. Also, a doctor can see a list of tests for verification of the diagnosis. Sometimes it makes sense. This software for proctologist still successfully works in Odessa Maritime Hospital. And we can make a software for any medical speciality.

The knowledge base within a narrow medical speciality is not very complicated. Problems begin while combining two or more specialities. Same as for doctors. If the diagnosis is not obvious, or the tests or examinations do not show the expected results then making a

diagnosis is getting more volume. We need more specialist for consultations, more tests and more examinations. In practice, this works no bad. But theoretically we can reach a result very fast. And it is very interesting to combine all medical sciences into one electronic knowledge base. By 2003 I have successfully finished prototype of the knowledge base. The knowledge base is not only a set of diseases and symptoms, but also there are several algorithms there. Some of the algorithm can find any symptom even it's very rare. Another one can find any disease using only one symptom with the likelihood up to 100%. Software was uploaded on a server, which I called "Server of Information and Analytical Medicine" and connected to the network. 2009 - 10th International Symposium Maritime Health I have submitted the Server Information and Analytical Medicine.



Figure 1

That time there was an idea to demonstrate the work and opportunities of the server, but not a Knowledge Base. That's why there was created several types of Knowledge Base on different types of platforms such as SQL, Oracle, MongoDB.

The presentations of the server continued till 2016. And also, the server was submitted on Global Summit on Telemedicine and e-Health 2015, Houston, USA: "Server of Information and Analytical Medicine, Ukraine".

Some countries such as Russian Federation use this title for medical government systems of Healthcare - "ИМИАС", but there is not a knowledge base in their systems.



Figure 2

In 2016 on International Congress of Digital Medicine. Nanjing - China I'm introducing "Database of illnesses and Symptoms and Universal Algorithm Forming its Structure".

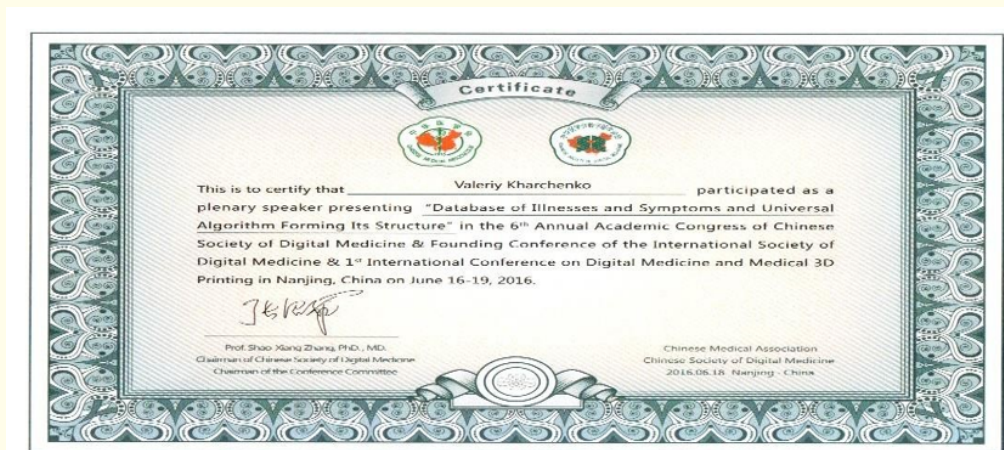


Figure 3

The knowledge base as a collection of diseases and symptoms is a great achievement in itself. However, algorithms are needed to process the data. Sometimes it is not enough to use only the algorithm of syndromic diagnosis. Differential diagnosis has existed in medicine for a long time. But it only works on a limited number of diseases that have similar symptoms. In contrast, I created an algorithm that can quickly find any disease with a 100% probability. I called it the Universal Formula of the Diagnostic Algorithm. And I have published several articles on the subject.

And now that there is a prototype of the Knowledge Base, there is a Syndromic Diagnosis Algorithm and there is a Universal Formula of the Diagnostic Algorithm, what is the next goal of the Knowledge Base? Perhaps it will be an Internet Hospital?

And although telemedicine consultations have existed for a long time, the next step in the development of medicine was the creation of an Internet hospital. And I developed SRS and concept of online consultations.

My Internet Hospital has been launched at 2017. When it was done it became extremely popular in post-Soviet Union countries.

Can we use the knowledge base for online diagnostic or consultations? In this case, it is necessary to develop an application for this task. And of course, it needs to top up. What is a new task for the knowledge base? What is the purpose of a knowledge base? The prototype knowledge base already exists, and the goal will indicate which application should be developed for that purpose.

Any development of some prototype knowledge base, as a point of mine, will require the mathematical proof algorithms and some good luck. Otherwise, the intra-base correlations will be unstable and the resulting data will be erroneous. And this is one of the main problems because in this case the result always will look true. Also, it should be some clinical trials. There is a special regulation for clinical trials. It may take years.

Conclusion

At the moment, in order to launch the knowledge base on the network, we simply need to determine the purpose where and for what the knowledge base will be used and the tasks that it will perform. That's it.

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