PRIUS PROPOSAL

Medical Diagnosis Expert System and its Implementation with Statistical and Machine Learning Approaches

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INTRODUCTION

Medical filed is one of the most important and involved field in human life. But still, when automation and expert systems are common in most other fields, Medical Diagnosis lacks them significantly. Most possible reason could be due to very low tolerance to error.

In country like India, where there are no doctors at all in remote areas, automated medical diagnosis expert system may prove very useful. We will try to develop one such expert system.

We will try to combine statistical methods with machine learning algorithms like One Class Classifier to get the perfect fitting algorithms to solve the problems. The whole system will be distributed so that Knowledge Base is enriched time to time by use of medical practitioners and expertise is then more evenly useful.

OBJECTIVES

As stated earlier, objective of project will be to automate process of medical diagnosis. Also the system and Knowledge Base will be distributed. So we must provide differentiated access to Knowledge Base to different users namely – Expert medical practitioners (Having maximum access), newbie medical practitioners (having limited access) and Normal users (having no access to Knowledge Base).

System should first ask about symptoms and other facts like age, gender, medical history etc. Then based on input, it should generate list of probable diagnosis along with the confidence level and naming the symptoms leading to each one. Also system should ask about more information about missing symptoms. Using this extra information, it can improve its results.

Finally if user is under normal user category, system should provide treatment options for most possible diagnosis. Otherwise, if user comes under category of expert or newbie practitioners, system should ask user to choose the diagnosis that user thinks is correct and then update its Knowledge using Machine Learning (ML) techniques like One Class Classifier so that next time it improves its diagnosis in case of similar situation.

POSSIBLE IMPLEMENTATION TECHNIQUES

For implementation, we must merge two approaches used in Artificial Intelligence namely – Statistical Approach and Machine Learning to get best result. Statistical Approach will help in developing good statistics about history of all diagnosis. Learning will help in adjustment of weightages given to each symptom for diagnosis of particular disease. Combining two approaches will use best from both of them.

Further system must be distributed so as to take maximum use of expertise of all practitioners together. Distributed system will converge to stable state much faster compared to stand-alone system and it will be more accurate.

We will model knowledge Base as distributed Database and to summarize, the project will use following technologies –

1. Statistical artificial intelligence approach.
2. Machine Learning methods.
3. Distributed systems development.
4. Database technologies.
5. Web front-end development.
6. Web back-end development.

DEPLOYMENT POSSIBILITIES AND USEFULLNESS

The proposed project if it goes to its completion within one year, it will be really very helpful at least in third world countries like India, where there is substantial scarcity of good medical practitioners especially in rural areas. Also this can help to check the malpractices in medical field (like prescribing costly medicines, suggesting unnecessary surgeries etc.) to some extent.