Expert System for Diagnosing Psychological Disorder

Course: Artificial Intelligence Lab (CSE 714)

Name: Lab Project Report

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Chapter 1

1.1 Background:

Human psychology is the most complex application of nature. We do not know what are going on someones mind. We can only estimate by seeing his facial appearances, body movements and facial expressions.Mental disorder issue is so serious that one in every eight people in the world live with a mental disorder. For many years the human thought on 'health' as the absence of hurt were considered as healthy who participated and came out of medieval battles without hurt. At present, the perception of 'health' is associated with the absence of disease. The World Health Organization (WHO) defines health is a state of complete physical well-being, mental and social, involving three areas that are interconnected with each other: physical health, psychological health and social health. When one is being sick, immediate steps can taken by surrounding people. But when a people falls on any mental disorder, others cant help them until the sick one confessed about mental disorder.Psychological disorders or mental disorders or psychiatric disorders is identified as a change of mental or behavioral pattern that causes sufferings and impairs the ability to function in ordinary life. Today is a technology based world. Here,people connect to each other more virtually than physically. They often show their happy face on social media. But they hide their real internal/psychological felling in the fear of other judgmental thought. As a result, more critical disorder of mental state are emerging. People can also take their life for not having enough mental strength. Thus, suicide case are significantly increasing day bay day. Many kind of mental problem are seen in our society. Such as

- **Anxiety Disorders:** Anxiety disorders are characterized by excessive and persistent fear, worry, anxiety and related behavioral disturbances Kupfer 2015.Fear involves an emotional response to a threat, whether that threat is real or perceived. Anxiety involves the anticipation that a future threat may arise. Types of anxiety disorders include: Generalized Anxiety Disorder (GAD), Social

Anxiety Disorder , Panic Disorder, Separation Anxiety Disorder.

- **Post-Traumatic Stress Disorder (PTSD):** PTSD can develop after an individual has experienced exposure to actual or threatened death, serious injury, or sexual violence. Symptoms of PTSD include episodes of reliving or re-experiencing the event, avoiding things that remind the individual about the event, feeling on edge, and having negative thoughts.
- **Feeding and Eating Disorders:** Eating disorders are characterized by obsessive concerns with weight and disruptive eating patterns that negatively impact physical and mental health Attia et al. 2013. Types of eating disorders include: Anorexia Nervosa, Bulimia Nervosa. Binge Eating Disorder and so on.
- **Sleep-Wake Disorders:** It is an interruption in sleeping that leads to distress and affects daytime functioning. Examples of sleep disorders include: Narcolepsy, Insomnia Disorder, Hypersomnolence, Restless Legs Syndrome and so on.
- **Schizophrenia:** Symptoms include persistent delusions, hallucinations, disorganised thinking, highly disorganised behaviour, or extreme agitation. People with schizophrenia may experience persistent difficulties with their cognitive functioning.

1.2 Problem statement:

Any kind of diseases have to be compelled to be treated well and on time. If they don't seem to be treated on time, they will cause many health problems and these issues could also become the reason for death. These can be worse because of the inadequacy of specialists, practitioners and health facilities. during a trial to cope with such issues, studies created makes a shot to vogue and develop professional systems which can supply recommendation for physicians and patients to facilitate the designation and advocate treatment of patients.

Expert System is one in all the foremost significant applications of computer science.It is a computer based software package designed to integrate the information and talent of an professional in a individual area and it is used for conclusion support systems Luxton 2013. In this work. expert system is used to know the type of disorder one is being have. Our expert system take the symptom of disorders as input and give exact disorder type with treatment and specialist information.

1.3 Objective:

Our aims of the proposed expert system are:

- To build a psychological disorder expert system for psychiatrist or learner with the advantage of boosting their ability, minimizing the error and cost for diagnosing and developing their clinical knowledge.
- To design a model for diagnosis the several psychological disorder to provide stronger information for mind therapist and patients.
- To design a model to recommend a specialist of a particular disorder to a patient.

Chapter 2

2.1 Expert System:

An expert system is a branch of Artificial Intelligence (AI) developed in mid-1960. Expert system first time appeared was General Purpose Problem Solver. An expert system is a system that uses human knowledge in which knowledge is incorporated into a computer and then used to solve problems that usually require human skills. The inside of the expert system consists of two main components, the knowledge base which contains the knowledge and the inference engine that illustrates the conclusion. The conclusion is the response of the expert system at the request of the user. Fig 2.1 shows the architecture of an expert system.

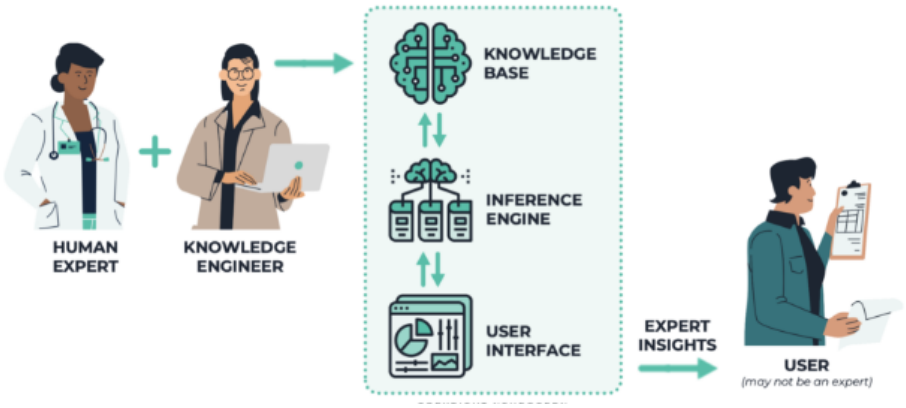

Figure 2.1: Expert System from Weindling n.d.

2.2 Methodology:

The proposed expert system performs diagnosis for psychological disorder of all stages of the human life starting with simple symptoms by asking yes or no questions. The proposed expert system will ask the user to ans the question with yes or no. At the end of the dialogue session, the proposed expert

system provides the diagnosis and recommendation of the disease to the user. To implement the exper system, turbo Prolog is used .Prolog is a rationale programming language. It has a significant part in computerized reasoning. In contrast to several other programming languages, Prolog is expected basically as a definitive programming language. In prolog, the rationale is communicated as relations (called Facts and Rules). In the program, a set of if condition are applied for diagnosis a specific disorder. Then according to the user respond the system give a disorder name with proper recommendation.Figure 2.2 shows working principle of the program.

. When we run the program with 'run' predicate Fig 2.3 displayed. It first want the patient's name.

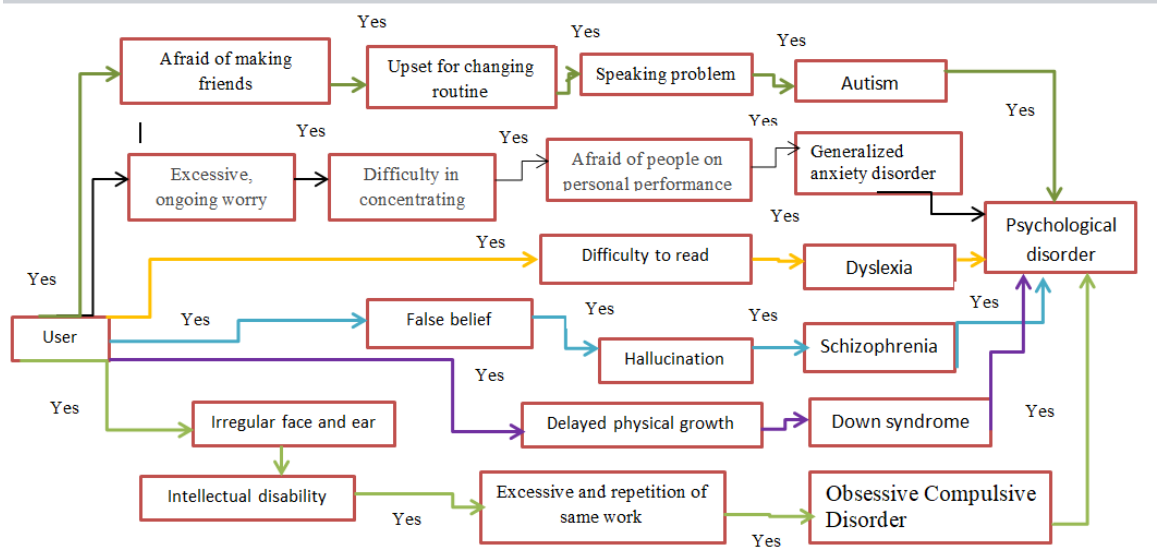

Figure 2.2: Working of the Program

Then, It ask some question one after another to diagnosis the patient's disorder. Fig 2.4 shows some questions asking from a user.

2.3 Result:

This prolog expert system is successfully implemented and result are taken. It is applied on many patients and its results are about 90% correct. For example, Sadia is a mental disorder patient whose symptoms are hallucination and false belief. She imagines her surrounding in a new way which is completely different with actual . She sees, hears, smells, tastes, or feels things that are not actually there. She has ways of thinking that are unusual or illogical. In this expert system, the patient or user is asked to answer with YES(y) or NO(n). If a particular symptoms are found means the yes gives y as answers of every required symptoms question. Finally, based on user's answer, the name

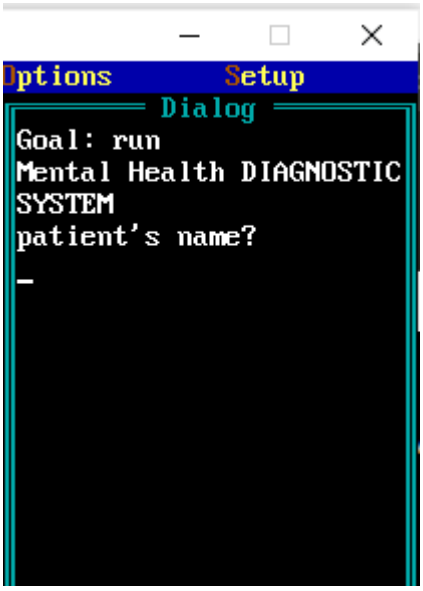

Figure 2.3: Output Widow with Some Question Taking from User

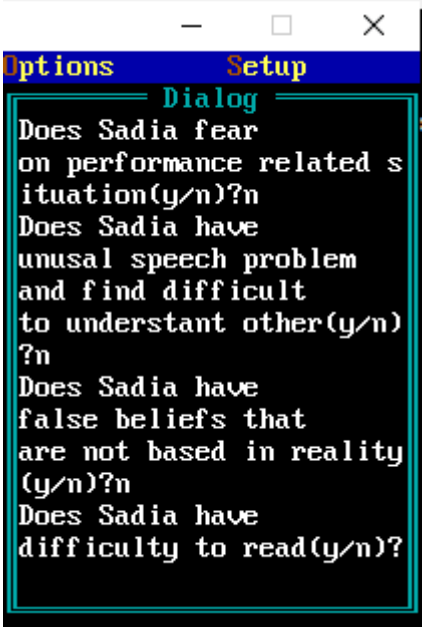

Figure 2.4: Output Widow with Some Question Taking from User

of disorder displayed on the screen with treatment and doctor recommendations. For sadia's case, it is Schizophrenia. So the expert system display the information available for Schizophrenia case. In Fig 2.4, A dyslexia patient case of the expert system result are shown..

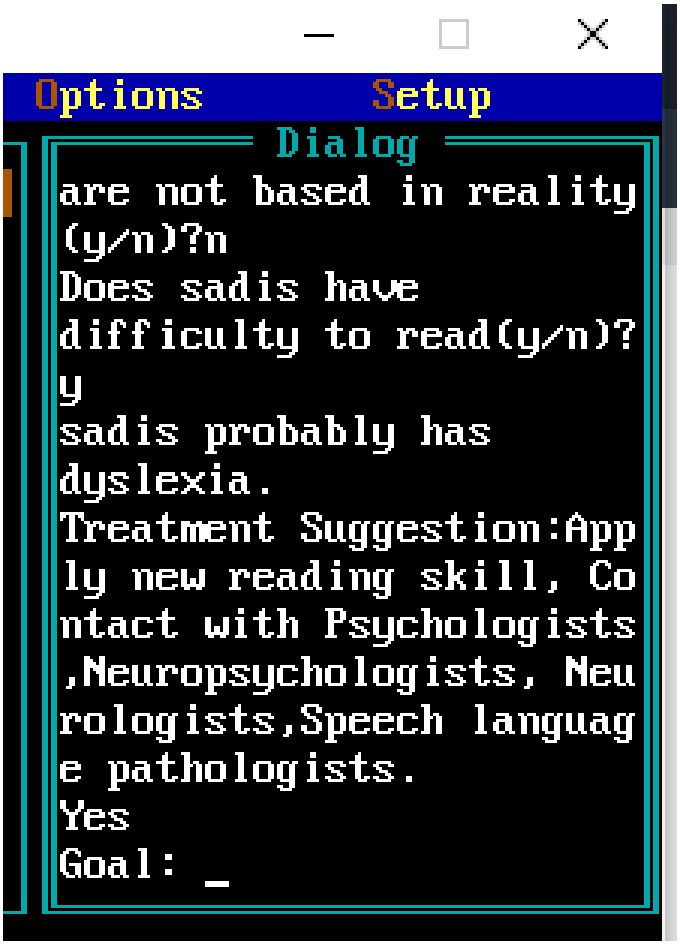

Figure 2.5: Final Output Window with Diagnosing of Psychological Disorder

2.4 Conclusion:

The medical system shows diagnosis of psychological disorders using intelligent system. Expert system with Rule-Based Reasoning method can be applied well for cases of psychological disorders and can also be used for other cases. Development of this method can also be done by combining with other methods or also compare the results with other expert system methods.The proposed expert system was presented for helping Psychologist in diagnosing patients with different symptoms possible psychological disorder. Psychologist and depression patients can get the diagnosis faster and more accurate than the traditional diagnosis. This expert system does not need intensive training to be used. It is easy to use and has user friendly interface. It was developed using turbo Prolog IDE in Prolog language in DOSBox 0.74. This

system also has some limitation. We only consider some case in our system. Human mind working is the most complicated thing to observe. So, it is possible there are other possible psychological disorders that are not considered in the system's knowledge base. Si, this knowledge base is incomplete but can be updated with times with new symptom and disorders. Besides, symptoms that are available are not hundred percent correct because of different law of mind, different human mind working, different life experience, different opinions and there are anomalies in psychology.

References

Attia, Evelyn, Becker, Anne E., Bryant-Waugh, Rachel, Hoek, Hans W., Kreipe, Richard E., Marcus, Marsha D., Mitchell, James E., Striegel, Ruth H., Walsh, B. Timothy, Wilson, G. Terence, Wolfe, Barbara E., and Wonderlich, Stephen (2013). "Feeding and Eating Disorders in DSM-5". In: *American Journal of Psychiatry* 170.11. PMID: 24185238, pp. 1237–1239. DOI: 10.1176/appi.ajp.2013.13030326. eprint: https://doi.org/10.1176/appi.ajp.2013.13030326. URL: https://doi.org/10.1176/appi.ajp.2013.13030326.

Kupfer, David J. (2015). "Anxiety and DSM-5". In: *Dialogues in Clinical Neuroscience* 17.3. PMID: 26487805, pp. 245–246. DOI: 10.31887/DCNS.2015.17.3/dkupfer. eprint: https://doi.org/10.31887/DCNS.2015.17.3/dkupfer. URL: https://doi.org/10.31887/DCNS.2015.17.3/dkupfer.

Luxton, David (Nov. 2013). "Artificial Intelligence in Psychological Practice: Current and Future Applications and Implications". In: *Professional Psychology: Research and Practice* 45. DOI: 10.1037/a0034559.

Weindling, Mark (n.d.). "AI: Machine Learning vs. Expert Systems". In: (). URL: https://www.neurocern.com/ai-machine-learning-vs-expert-systems/.