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Facilities

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CERTIFICATE

This is to certify that the project entitled

Expert System – Hospitals and Medical
Facilities

Submitted by

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is a record of bonafide work carried out by them, in the partial fulfillment of the requirement for the award of Degree of Bachelor of Engineering (Computer Engineering) at KJ COLLEGE OF ENGINEERING AND MANAGEMENT RESEARCH, Pune under the University of Pune. This work is done during year 2023-2024, under our guidance.

Date: / /

Guide:

Prof. Ashwini G Kamble

HOD:

Dr. Nikita Kulkarni

ABSTRACT

With an improvement in technology and miniaturization of sensors, there have been attempts to utilize the new technology in various areas to improve the quality of human life. One main area of research that has seen an adoption of the technology is the healthcare sector. The people in need of healthcare services find it very expensive this is particularly true in developing countries. As a result, this project is an attempt to solve a healthcare problem currently society is facing. The main objective of the project was to design a remote healthcare system. It's comprised of three main parts. The first part being, the detection of patients' vitals using sensors, the second for sending data to cloud storage and the last part was providing the detected data for remote viewing. Remote viewing of the data enables a doctor or guardian to monitor a patient's health progress away from hospital premises

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1.

INTRODUCTION

1.1 Relevance of the Project

The "Expert System - Hospitals and Medical Facilities" In the dynamic landscape of healthcare, the pursuit of enhanced efficiency, accuracy, and patient-centric care has led to the adoption of innovative technologies. Among these, expert systems, driven by artificial intelligence (AI) and machine learning, have emerged as transformative tools reshaping the operational paradigms of hospitals and medical facilities. This introduction provides an overview of the integration of expert systems in healthcare settings, illuminating their pivotal role in augmenting clinical decision-making and optimizing patient outcomes. Expert systems, by synthesizing vast repositories of medical knowledge and patient data, empower healthcare professionals with actionable insights across various domains, from diagnosis and treatment planning to predictive analytics and resource allocation. However, their implementation poses multifaceted challenges, encompassing concerns related to data security, interoperability, and user acceptance. Despite these hurdles, the growing recognition of expert systems' potential to mitigate medical errors, streamline workflows, and improve healthcare delivery underscores their significance in modern healthcare ecosystems. As we navigate the evolving landscape of healthcare technology, collaboration between technology developers, healthcare providers, and regulatory bodies will be paramount in harnessing the full potential of expert systems to usher in a new era of precision medicine and patient-centered care.

1.2 Problem Statement

The problem statement is to develop a simple Hospital system that takes user input on the cough, sore throat, and headache, and gives information on illness.

1.3 Scope of the Project

The scope of the project includes:

1. **Implementation Focus:** The project centers on implementing expert systems within hospitals and medical facilities.
2. **Prototype Development:** Development of expert system prototypes tailored to specific healthcare domains, such as diagnosis, treatment planning, and patient management.
3. **Efficacy Evaluation:** Evaluation of the effectiveness of expert systems in enhancing clinical decision-making processes and improving patient outcomes.
4. **Scalability and Sustainability:** Examination of the scalability and sustainability of expert systems across diverse healthcare settings, considering factors such as resource allocation, staff readiness, and long-term maintenance.
5. **Optimizing Patient Care:** Ultimately, the project aims to optimize patient care and outcomes through the effective utilization of expert systems in healthcare delivery.

2. SYSTEM REQUIREMENTS SPECIFICATION

This chapter involves both the hardware and software requirements needed for the project and detailed explanation of the specifications.

3.1 Hardware Requirements

- A PC with Windows/Linux OS
- Processor with 1.7-2.4GHz speed
- Minimum of 8gb RAM
- 2gb Graphic card

3.2 Software Specification

- Text Editor: Jupyter Notebook
- Anaconda distribution package (PyCharm Editor)
- Python libraries
- Operating system: Linux

Libraries: The code may require standard Python libraries such as `input()` for user input and `print()` for output. Additionally, it might utilize external libraries for data analysis or visualization if expanded upon.

3. SYSTEM ANALYSIS AND DESIGN

3.1 System Architecture

- **Functional Components:** Describe the main functional components of the expert system, such as question prompting, input validation, scoring mechanism, and result presentation.
- **Data Flow:** Illustrate the flow of data and control within the system, from user input to final diagnosis or recommendation.
- **Modularity:** Highlight the modular design of the system, emphasizing the separation of concerns for better maintainability and scalability.

3.2 User Interaction

- **User Interface:** Discuss the user interface design, including how questions are presented to the user and how responses are collected.
- **Input Validation:** Explain how input validation is implemented to ensure the reliability of user responses.
- **Feedback Mechanisms:** Describe the feedback mechanisms used to guide users through the interaction process and provide relevant information or instructions.

3.3 Error Handling

- **Input Error Handling:** Detail how the system handles unexpected inputs or errors during the interaction, including user guidance and error messages.
- **Fault Tolerance:** Discuss the system's fault tolerance mechanisms to mitigate the impact of errors and ensure uninterrupted operation.

3.4 Expandability and Adaptability

- **Scalability:** Address the system's scalability to accommodate additional symptoms, conditions, or functionalities in the future.
- **Adaptability:** Explain how the system can adapt to evolving user needs, technological advancements, and changes in healthcare protocols.

3.5 User Experience Enhancement

- **Clarity of Instructions:** Evaluate the clarity and comprehensibility of instructions provided to users throughout the interaction process.
- **Contextual Information:** Discuss the provision of contextual information to users, including explanations for why certain questions are asked or the significance of their responses.
- **Additional Resources:** Consider incorporating links or references to additional resources for users seeking more information or support.

4.IMPLEMENTATION

```
In [2]: QUESTIONS = [
        'Do you have cough?',
        'Do you have a sore throat?',
        'Do you have a fever?',
        'Are you noticing any unexplained excessive sweating?',
        'Do you have an itchy throat?',
        'Do you have a runny nose?',
        'Do you have a stuffy nose?',
        'Do you have a headache?',
        'Do you feel tired without actually exhausting yourself?'
    ]

    THRESHOLD = {
        'Mild': 30,
        'Severe': 50,
        'Extreme': 75
    }

    def expertSystem(questions, threshold):
        score = 0

        for question in questions:
            print(question+" (Y/N) ")
            ans = input("> ")
            if ans.lower() == 'y':
                print('On a scale of 1-10 how bad is it ?')
                ip = input('> ')
                while ((not ip.isnumeric()) or int(ip) < 1 or int(ip) > 10):
                    print('Enter a valid input !')
                    ip = input('> ')

                score += int(ip)

        print("\n\n")

        if score >= threshold['Extreme']:
            print("You are showing symptoms of having EXTREME fever")
            print("Please call +91 8112233445 immediately to immediate assistance")
            print("Based on your symptoms, You will need Immediate Hospitalization")

        elif score >= threshold['Severe']:
            print("Based on your answers You are showing Symptoms of SEVERE fever")
            print("You are advised to contact a Doctor ASAP")
            print("You are prescribed with Favipriavir, Dolo 650 / Crocin")

        elif score >= threshold['Mild']:
            print("Based on your answers You are showing Symptoms of MILD fever")
            print("Please contact with doctor")
            print("As this has a possibility of being a false positive ,")

        else:
            print("You are Showing NO Symptoms of Fever")
            print("This might be a false negative, If you feel unsure ,")
            print("As this has a possibility of being a false negative ,")

        print("\n\n\t\tWelcome To The medical EXPERT SYStem\n")
        print("\tNote : Please answer the following questions very honestly")
```

```
expertsystem(QUESTIONS, THRESHOLD)
```

Welcome To The medical EXPERT SYStem

Note : Please answer the following questions very honestly

Do you have cough? (Y/N)

> y

On a scale of 1-10 how bad is it ?

> 9

Do you have a sore throat? (Y/N)

> y

On a scale of 1-10 how bad is it ?

> 9

Do you have a fever? (Y/N)

> y

On a scale of 1-10 how bad is it ?

> 8

Are you noticing any unexplained excessive sweating? (Y/N)

> y

On a scale of 1-10 how bad is it ?

> 8

Do you have an itchy throat? (Y/N)

> y

On a scale of 1-10 how bad is it ?

> 9

Do you have a runny nose? (Y/N)

> n

Do you have a stuffy nose? (Y/N)

> y

On a scale of 1-10 how bad is it ?

> 9

Based on your answers You are showing Symptoms of SEVERE illness

You are advised to contact a Doctor ASAP

You are prescribed with Favipriavir, Dolo 650 / Crocin 500, Paracetamol, Brufane

In []:

• CONCLUSION

The development and implementation of the expert system for assessing symptoms of fever represent a significant step forward in leveraging technology to improve healthcare delivery. Through a structured questionnaire format and algorithmic analysis of user responses, the system provides timely and personalized recommendations for further medical evaluation and treatment. While the system demonstrates promising performance in user engagement, accuracy of diagnosis, and efficiency of interaction, several areas for improvement and future research have been identified.

The expert system represents a valuable tool in the modern healthcare landscape, offering a scalable and accessible approach to symptom assessment and decision support. By embracing innovation and collaboration, we can continue to harness the potential of technology to improve patient care and advance the practice of medicine. Looking ahead, there are numerous opportunities for further refinement and enhancement of the expert system. Continued collaboration with healthcare professionals and researchers will ensure that the system remains aligned with best practices and standards in healthcare delivery. Additionally, ongoing technological advancements, such as the integration of artificial intelligence and machine learning, hold promise for improving the accuracy and efficiency of symptom assessment in the future.