# 15 Day Report Part-1

1. **What theme have you decided for your project?**

   The theme decided by us for our project is "**Public Welfare**".

2. **What is your problem statement?**

   Medical misdiagnosis is a global healthcare challenge with severe patient consequences. In India, the National Library of Medicine reports approximately **52 lakhs cases of medical negligence annually**, with a **110%** increase in recent years. Reports suggest that most of the time the skill or knowledge is not in question, instead it is lack of communication. One such case is illustrated by a team member's personal experience, where she faced a life-threatening situation due to an overdose of cold and cough medicine, resulting in an emergency ICU admission. This alarming incident demands the urgent need for an accurate and reliable medical diagnosis system to prevent such misdiagnosis and ensure patient's safety. So we have decided to work on an effective and accurate **symptom-based disease diagnosis system utilizing tree data structure.** The system will prompt users to input their symptoms using an initial question set after which they will be asked follow up questions. Upon completion, it will provide the user with the most likely diagnosis or a list of potential conditions, along with relevant information about each. The goal is to create an **intuitive and accurate platform** for self-assessment of medical symptoms, aiding users in seeking appropriate medical advice and treatment.

3. **What is the scope of your project?**

   **Medical Utility**:A symptom-based disease diagnosis system holds immense potential for assisting healthcare professionals in making accurate diagnoses, particularly in regions with limited medical expertise.

   **Accessibility**:By offering the system online or through mobile applications, it can reach a wide audience, including remote areas or regions with limited healthcare access, thus improving accessibility to medical information.

   **Education and Awareness:**The system can serve as an educational tool, providing valuable information on various diseases, symptoms, and treatment options, which will not only assist individuals and researchers but also contribute to improving the public healthcare outcomes.

**Early Detection:**Facilitating early detection of diseases, the system can prompt users to seek medical attention for symptoms that might otherwise be overlooked, leading to better treatment outcomes.

The system can currently identify **20+ diseases** based on symptom analysis, providing a comprehensive approach to disease diagnosis and management.

### 4. What data structure have you decided to use and why?

We have decided to use Tree data structure for our project for the following reasons:

**Hierarchical Organization:** Trees offer a natural way to organize symptoms hierarchically, similar to how nodes and branches are structured in a tree data structure. Here each node represents a symptom or a group of symptoms and enables a structured and logical diagnostic process.

**Systematic Questioning:** By categorizing symptoms into nodes and branches, the system can ask questions in a structured manner, guiding users through a logical process of elimination. Trees facilitate efficient traversal, allowing the system to quickly narrow down the symptoms based on user inputs and also support multi-level diagnosis.

**Speed and Accuracy**: The hierarchical arrangement speeds up the diagnosis process by eliminating irrelevant conditions early, leading to faster and more accurate results.

**Visual Representation:** Tree diagrams provide a visual representation of the diagnostic process, making it easier for healthcare professionals and patients to follow and interpret the reasoning behind the diagnosis.

### 5. Did you think of any other data structures with similar functionality required for your project? Why did you not choose them instead?

During the decision making phase we had thought of using Linked Lists,switch-case statements or Graphs for our project however each one of them posed certain challenges while implementing them in our project.

**Linked Lists:**Linked lists are efficient for sequential data access but lack the hierarchical structure needed for complex decision paths in symptom-based questioning and

diagnosis. They don't naturally represent branching paths, making them less suitable for our needs.

**Switch-Case Statements:**Switch-case statements handle multiple conditional branches based on individual values but become difficult as cases grow. In symptom-based diagnosis,too many symptoms and combinations make switch-case impractical and hard to maintain as they lack flexibility for dynamic changes in the diagnosis process.

**Graphs:**Graphs can represent relationships between entities, but they were too complex for our needs. While they could capture decision paths in our diagnosis system, managing and traversing them efficiently could be more challenging compared to simpler hierarchical structures like trees.

6. **Have you started working on your project and what all did you accomplish in the past 2 weeks?**

        Over the past two weeks, as beginners in data structures and algorithms, we focused on the thorough understanding of our project's problem statement before getting into technical details. With guidance from our mentor, we chose to develop a symptom-based disease diagnosis system, recognizing its significance in healthcare.Our focus then shifted to selecting the right data structure. Through research and mentorship, we discovered that trees were ideal for representing hierarchical decision paths, crucial for our diagnosis system's accuracy.We began by learning tree terminologies like root nodes, leaf nodes, and edges, dedicating time to master tree traversal techniques for efficient navigation. This helped us in building up a basic structure for our project.During this phase, we collaborated intensely for a week to refine our tree structure that we had created on paper to work on the symptom complexity effectively and understand the project's initial flow. We combined tree structures with medical research to ensure accuracy and relevance.

7. **Did you face any problems in these 15 days and were you able to resolve them?**

        In the early stages of our project, we faced some tough challenges. One big hurdle was the amount of research needed, especially in the medical field. We had to understand a lot about different diseases, their symptoms, and how doctors diagnose them.Another challenge was figuring out how to organize our tree structure. We had to make sure it represented the way doctors diagnose diseases accurately. This meant carefully planning out the different paths and decisions in the tree. We had to work together closely, trying

different ideas and refining them until our structure made sense for a wide range of symptoms and diseases.

**8. Did you initiate a conversation with your mentor? How has the mentor helped you in finalizing your them and problem statement?**

Yes,we have initiated conversation with our mentor.Our mentor Gaurika Gupta has been extremely helpful throughout the problem statement selection process. She highlighted the importance of choosing a real world and relevant problem statement which aims at using our technical knowledge for public welfare. Initially,we had come up with multiple ideas but through insightful discussions our mentor guided us towards making a diversified medical diagnosis system that resonated with both our interests and societal needs.Her expertise and clear understanding helped us in formulating a precise problem statement.