PRIORITY BASED TASK SCHEDULING FOR HEALTHCARE IOT USING EDGE COMPUTING

23CSE362 Edge Computing

24_HeartAttack

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Referenced Research Paper:

Title: Priority-based task scheduling and resource allocation in edge computing for health monitoring system

Authors: Zubair Sharif, Low Tang Jung, Muhammad Ayaz, Mazlaini Yahya, Shahneela Pitafi

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Queries:

1. What is the kind of tasks being executed at edge and cloud level?

   A “task” in the context of this project just refers to a group of sensor readings since we are not diving into the resource allocation aspect of the research paper and focusing on the task scheduling aspect. Each task will have parameters to represent different sensor values such as heart rate, blood pressure, glucose level. Using these values and the priority assigning module we will assign each task with a priority value, k from 0 to 2. Then based on this k value we decide whether to schedule a specific task in the edge queue or the cloud queue. The k value also has thresholds to identify dire emergencies and activate alarms in case of very high values.

2. Do you use an ML model for this approach and why?

   The research paper doesn't explicitly mention the use of any ML model. However, we will make use of one model for our implementation. The priority calculation for tasks in our implementation is done of the basis of the priority formula as mentioned in the research paper. However, some patients who are obese, malnourished, older in age or other less common demographics will have different average values for their heart rates, blood pressure and glucose levels. To tackle this, we categorize patients as "general" and "specific". The general patient's tasks make use of the priority assignment module to calculate its priority whereas the specific patient's tasks will make use of a highly trained ML model which also takes into account the patient's age weight and height values to predict the priority value. Thus, the ML model can help is making the system useful for a wider demographic.

3. Any fail-safe measures for edge nodes?

   We have still yet to come up with an actual failsafe measure for the edge nodes. The current idea we are trying to implement is to have neighboring edge nodes take over the tasks in the failed node until it is in working condition

4. Is each edge node for an individual patient?

   No each edge node is tasked with scheduling tasks for multiple patients consecutively thereby effectively utilizing the processing power of a given node.

5. How do we prioritize tasks when two tasks of same priority value are to be processed?

   One of the solutions we came up with is to assign numerical values to the different parameters which affect the priority. For example, heart rate will have a higher value than blood pressure and glucose will have a lower one. Then we can calculate a secondary value m which is based entirely on the parameters which causes the task to have a high priority. This secondary priority value m only comes into play when the above-mentioned situation occurs, essentially acting as a tie breaking mechanism.

Implementation Strategy:

The implementation will be simulation based; done through iFogsim2 and Eclipse Java IDE

Current Project Progress:

- Simulated the creation of system devices such as the edge node, cloud node, sensor and actuator
- Priority assigning module which assigns priority to a task based on its parameters, using the priority formula mentioned in the research paper
- Sample simulation of real-time monitoring through sensor data from csv file
- Proper scheduling of tasks onto edge and cloud queues.