**Sensor Fusion Task**

**Assumptions:**

* The assumption that the data in both the CSV and JSON files are sorted by timestamp is implicit, but it's important to note that the fusion process relies on this assumption.

**Algorithm**

1. **Read and Store Data**: First, we read data from a CSV file “task\_imu.csv” and store it in a structured format.
2. **Track Time**: We keep track of the time of the first entry in a variable called prev\_timestamp.
3. **Process Each Entry**: For each entry in the JSON data:
   * If it's the first entry, we set prev\_timestamp to the time of this entry and go to the step 4.
   * Otherwise, we calculate the time difference between the current entry and prev\_timestamp.
4. **Check Time Difference**:
   * If the time difference is small enough i.e. 2 seconds, we update the current group (or cluster) with the new data.
   * We also find the closest matching row in the CSV data using binary search and update the direction (heading) using a Kalman filter.
5. **Handle Large Time Difference**:
   * If the time difference is too large, we calculate the average time for the current group.
   * We find the closest matching row in the CSV data using binary search for this average time and determine the state (e.g., standing or driving).
   * We save the current group to a CSV file (data\_fusion.csv).
6. **Reset and Add New Data**: We then reset the group and start a new one with the current entry's data.
7. **Final Step**: After processing all entries, we save the last group to the CSV file.