Rehabilitation Monitoring System Requirements Analysis (Analysis Team Perspective)

Role: Algorithmic Data Analysis & Service Provision

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1. Internal Requirements for the Analysis Team

1.1 Core Objectives

Input: Calibrated hip joint motion data from the Data Team (e.g., angles, angular velocities, trajectories in anatomical coordinates).
Output:
Quantified comparison between patient motion patterns and standard benchmarks (e.g., deviation percentages, anomaly flags).
Personalized rehabilitation recommendations (e.g., exercises, intensity, frequency).

1.2 Key Requirements

Category	Details
Algorithm Design	1. Develop motion pattern comparison algorithms (e.g., Dynamic Time Warping). 2. Build anomaly detection rules (e.g., asymmetry >15% triggers alerts).
Data Parsing	1. Define input data format (JSON schema, coordinate standards). 2. Implement data validation (e.g., handling missing sensor data).
Performance	1. Algorithm latency . 2. Accuracy (vs. clinical evaluations).
Collaboration	1. Git branch management. 2. API documentation standards (Swagger/YAML).

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2. Cross-Team Collaboration

2.1 Dependencies on the Data Team

Required Services:
Data Content:
Calibrated sensor data (resolved drift errors).
Standard motion pattern database (healthy hip joint parameters by age/gender).
APIs:

```
// Example: Real-time sensor data format  {
  "sensor_id": "HIP_LEFT_UP",
  "timestamp": "2024-05-20T10:00:00.000Z",
  "angle_x": 45.2,
  "angular_velocity_y": 30.5,
```

"coordinate_system": "anatomical" }

Quality SLA: Sensor synchronization (timestamp error <1ms), data loss rate <0.1%.

2.2 Services to the UI Team

Provided APIs:

API 1: Real-Time Feedback

Endpoint: POST /analysis/realtime-feedback

Response Example


```
{
  "patient_id": "P001",
  "session_id": "S20240520",
  "status": "abnormal",
  "metrics": {
    "flexion_deviation": "-12%",
    "asymmetry": "18%"
  },
  "recommendations": [
    {
      "action": "Side Leg Raises",
      "frequency": "3 sets/day",
      "intensity": "Medium resistance"
    }
  ]  }
```


API 2: Historical Trends

Endpoint: GraphQL query for time-range-specific progress reports.

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3. Risks & Mitigations

Risk	Mitigation
Data calibration delays	Fallback mode using raw data + error labels (coordinated with Data Team).
Frequent UI API changes	Versioning (v1/v2) with 3-month backward compatibility.
Clinical validation gaps	Joint reviews with medical experts to refine algorithm thresholds.

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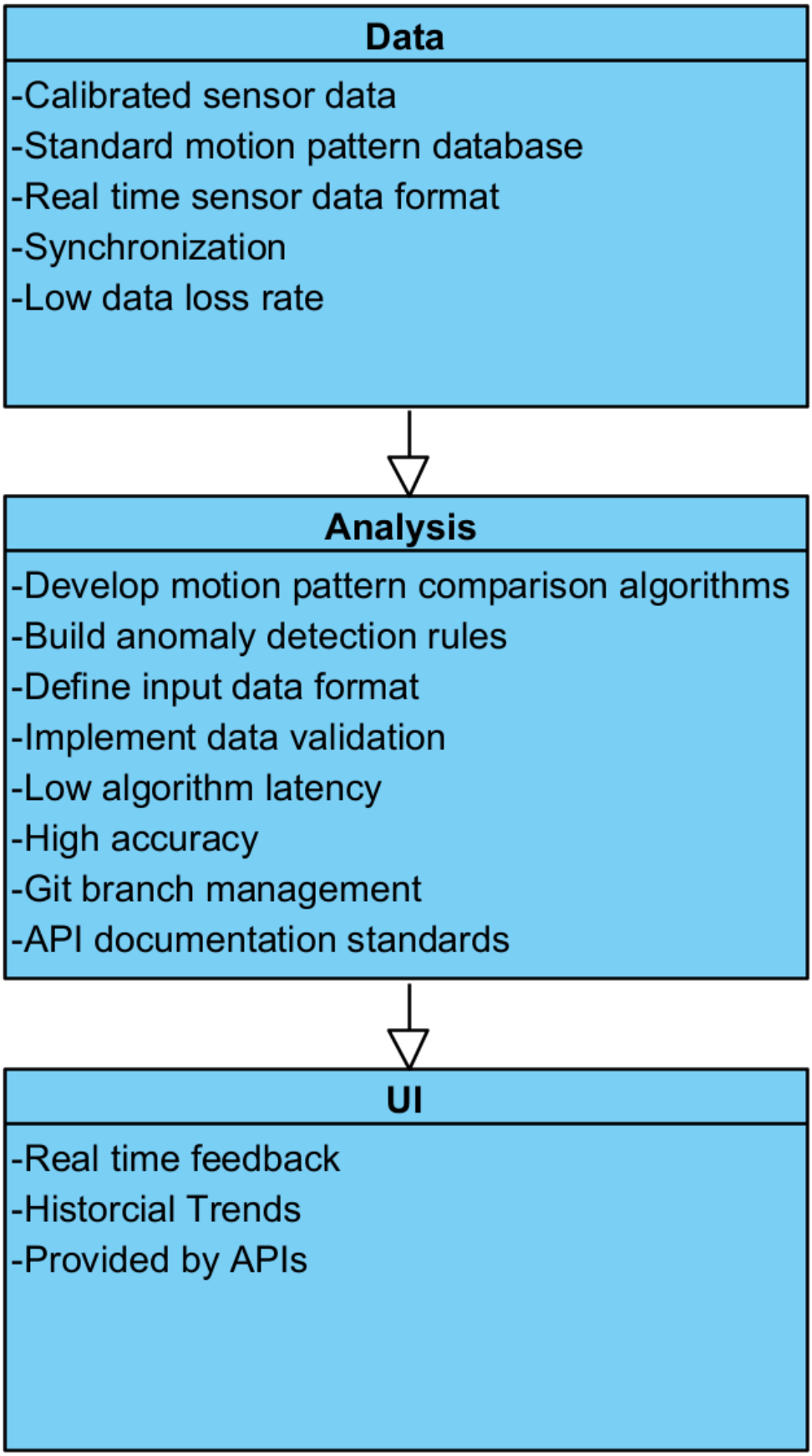
4. Deliverables

API Documentation: JSON schemas, error codes, and testing guidelines.

Mockups: Postman collections for API testing.


Data
-Calibrated sensor data
-Standard motion pattern database
-Real time sensor data format
-Synchronization
-Low data loss rate
Analysis
-Develop motion pattern comparison algorithms
-Build anomaly detection rules
-Define input data format
-Implement data validation
-Low algorithm latency
-High accuracy
-Git branch management
-API documentation standards
UI
-Real time feedback
-Historcial Trends
-Provided by APIs