Decision Module

🔹 **Overview**

This module enables NeuroPolis to translate real-time crisis signals into automated, context-aware actions using a hybrid of rule-based logic and machine learning. It ensures rapid, localized response decisions grounded in verified data and cross-domain intelligence.

🔹 **Possible Actions**

| **Type** | **Example** |
| --- | --- |
| Evacuation | “Evacuate Zone C” |
| Rerouting | “Reroute ambulances away from flooded roads” |
| Resource Mobilization | “Send emergency team to power grid B” |
| Shutoffs | “Cut electricity in Sector 7 to prevent fire” |
| Public Alerts | “Issue flood warning to District 12” |

🔹 **Rule-Based Logic**

*python*

if flood\_risk > 0.8 and population\_density > threshold:

action = "Evacuate Zone A"

if hospital\_load > 90% and ambulance\_delay > 10:

action = "Reroute ambulances to Hospital B"

**🔹 Condition-Action Threshold Table**

| **Condition** | **Threshold** | **Recommended Action** |
| --- | --- | --- |
| Flood Level | > 75% | Evacuate |
| Hospital Bed Usage | > 90% | Reroute Ambulances |
| Road Accessibility | < 30% | Close Roads / Reroute |

**🔹 Learning Decisions – AI/ML Layer**

Utilizes historical patterns and real-time feature correlations (e.g., traffic, sensor spikes, population density) to optimize decision rules dynamically using models like Gradient Boosting and Logistic Regression.

**🔹 Centralized Blockchain Ledger – Tweet Validation**

* Validates citizen reports by cross-matching with ground-truth sensors.
* Stores all decision logs and misinformation checks as immutable entries.
* Ensures traceability and auditability of emergency actions.

**🔹 Conclusion & Use Cases**

The Decision Recommendation Module enables proactive, data-driven crisis management for:

* Urban flooding and evacuation planning
* Real-time ambulance dispatch optimization
* Grid-level power restoration coordination
* Mitigation of misinformation-fueled panic

Whether integrated in a smart city command center or scaled across regions, this module ensures that every action is timely, explainable, and verifiable—supporting trust and coordination when it matters most.