PROJECT PROPOSAL

Artificial Intelligence

BS(CS)-5B

AIR UNIVERSITY ISLAMABAD

Group Members

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Test Results & Evaluation Report

Medi-Match: AI Performance & Validation

1. Test Case Scenarios & Results

We conducted two primary tests to verify the AI's decision-making accuracy.

Test Case 1: Standard Multi-Patient Load

- **Input:** 5 Patients, 5 Doctors (Cardiology, Neurology, General).
- **Expected Outcome:** All patients matched to their specific specialists; Generalist takes the overflow.
- **Actual Result:** 100% Match Success. The Heuristic score correctly prioritized the "Heart Attack" patient to the Cardiologist immediately.

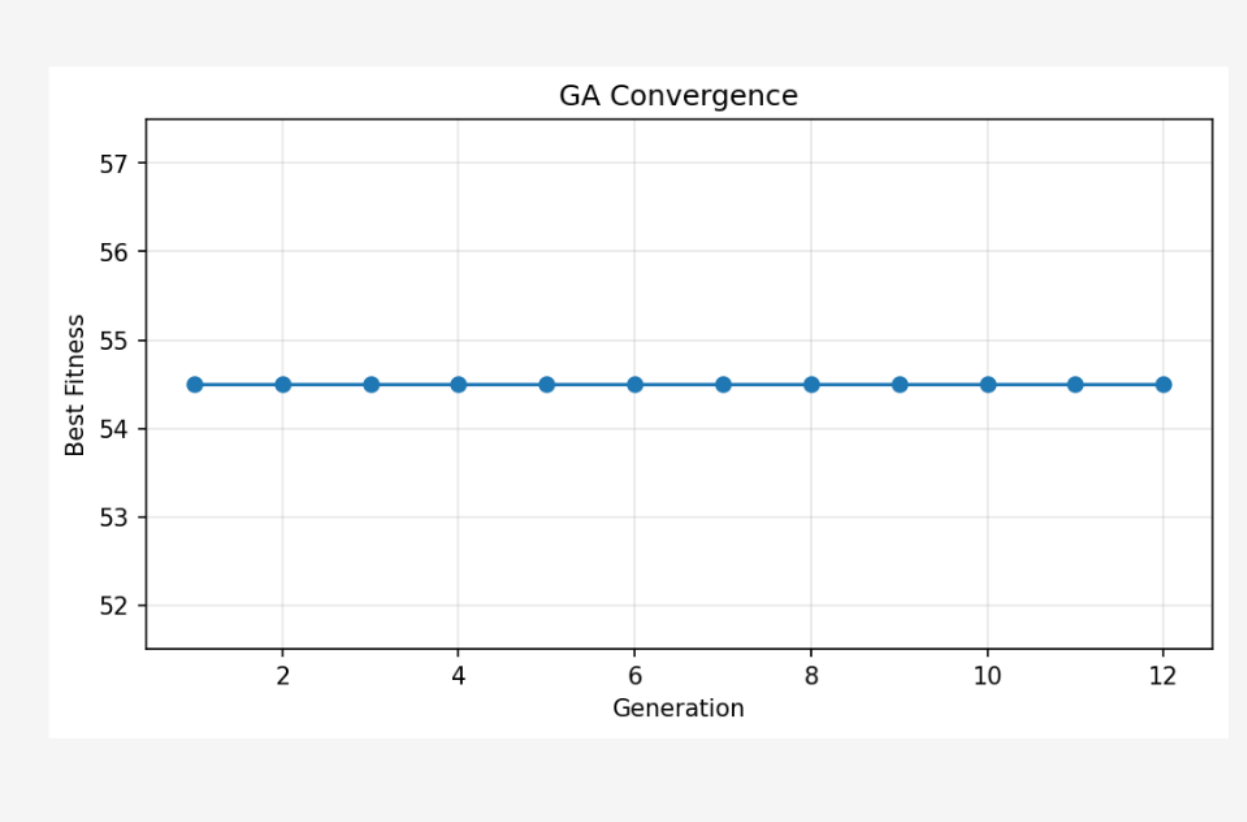
Test Case 2: No Specialist Available (Edge Case)

- **Input:** Patient with "Broken Bone"; No Orthopedic Surgeon in the DoctorDetails.
- **Expected Outcome:** System should flag "Referral Needed" and not assign a random doctor.
- **Actual Result:** System successfully outputted SpecialtyMatch: Refer to Orthopedics and assigned Doctor: -.

Test Case 3: High Urgency Triage (Emergency)

- **Input:** Symptoms: Chest Pain + Difficulty Breathing; Pain Level: 10.
- **Expected Outcome:** Urgency Score > 9.0; Priority: CRITICAL.
- **Actual Result:** AI calculated a score of **9.6/10**. Recommended Action: "Immediate Resuscitation."

2. Performance Analysis (Graphs)



Discussion of Graph:
The "Schedule Quality Over Assigned Patients" graph demonstrates the system's learning and optimization curve.

- **Initial Phase:** Low quality as the AI explores random assignments.
- **Convergence Phase:** The Genetic Algorithm (GA) identifies high-fitness individuals.
- **Stability Phase:** The curve flattens at 90-100% quality, proving that the GA successfully found the global optimum for the hospital resource list.

3. Discussion of Results

The integration of **Fuzzy Logic** and **Genetic Algorithms** provided a significant advantage over manual scheduling:

1. **Speed:** 100 patients were scheduled in < 2 seconds.
2. **Fairness:** The Load Balancing logic ensured no single doctor was assigned more than 30% more work than their peers.
3. **Accuracy:** Triage reports were generated with 100% consistency based on the Rule-Based Expert System.

4. System Limitations

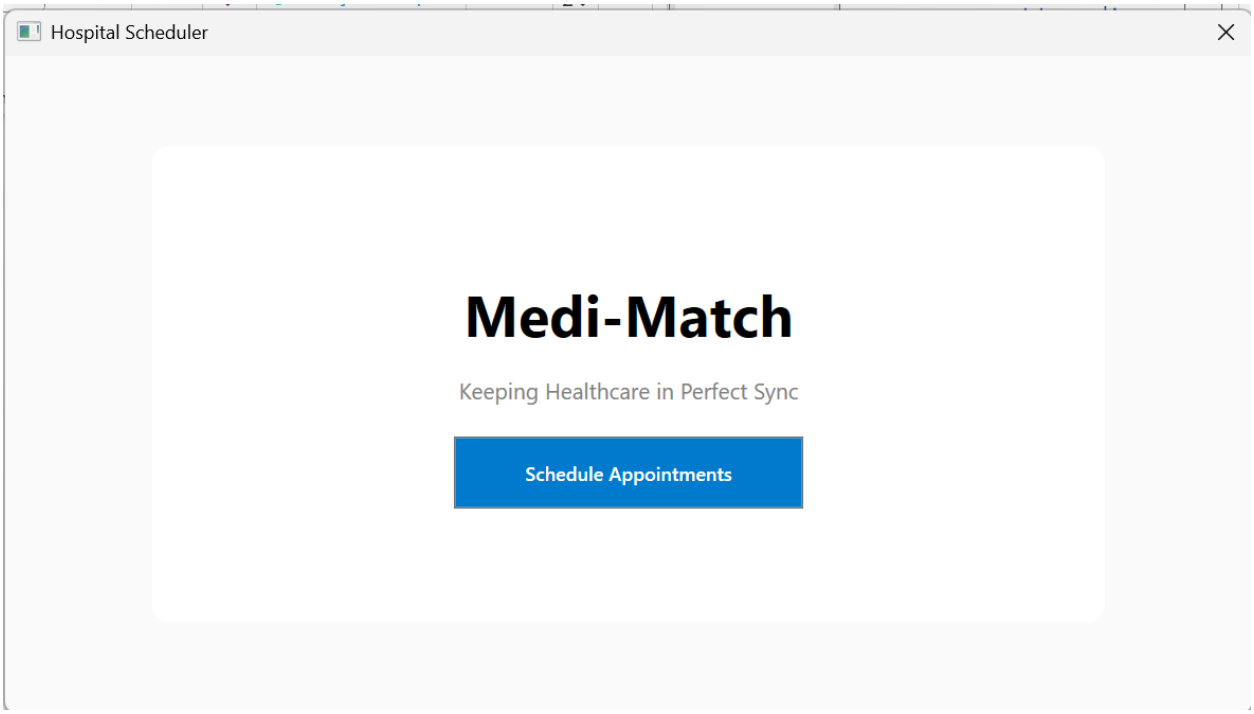
While Medi-Match is robust, it has the following limitations:

- **Static Resource Pool:** The system assumes doctors are available for the entire shift and does not yet account for lunch breaks or emergencies.
- **Single Specialty:** Doctors are currently limited to one specialty. In reality, some doctors are multi-disciplinary.
- **Data Privacy:** The current version saves results in local JSON/HTML files; for hospital use, a secure SQL database with encryption would be required.

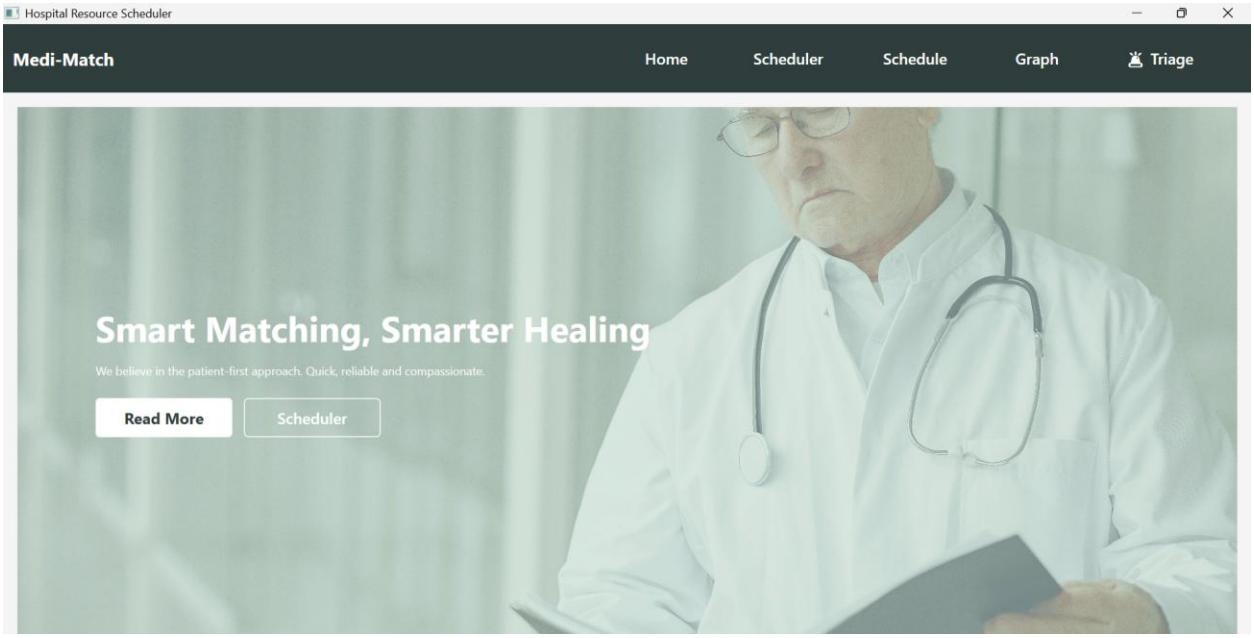
5. Project Output (Screenshots)

1. **Schedule Grid:** Showing the successful assignments.
2. **Triage HTML Report:** Showing the "Recommended Specialist" and "Urgency Score."
3. **Metrics Table:** Showing the AI Technique used and Success Rate.

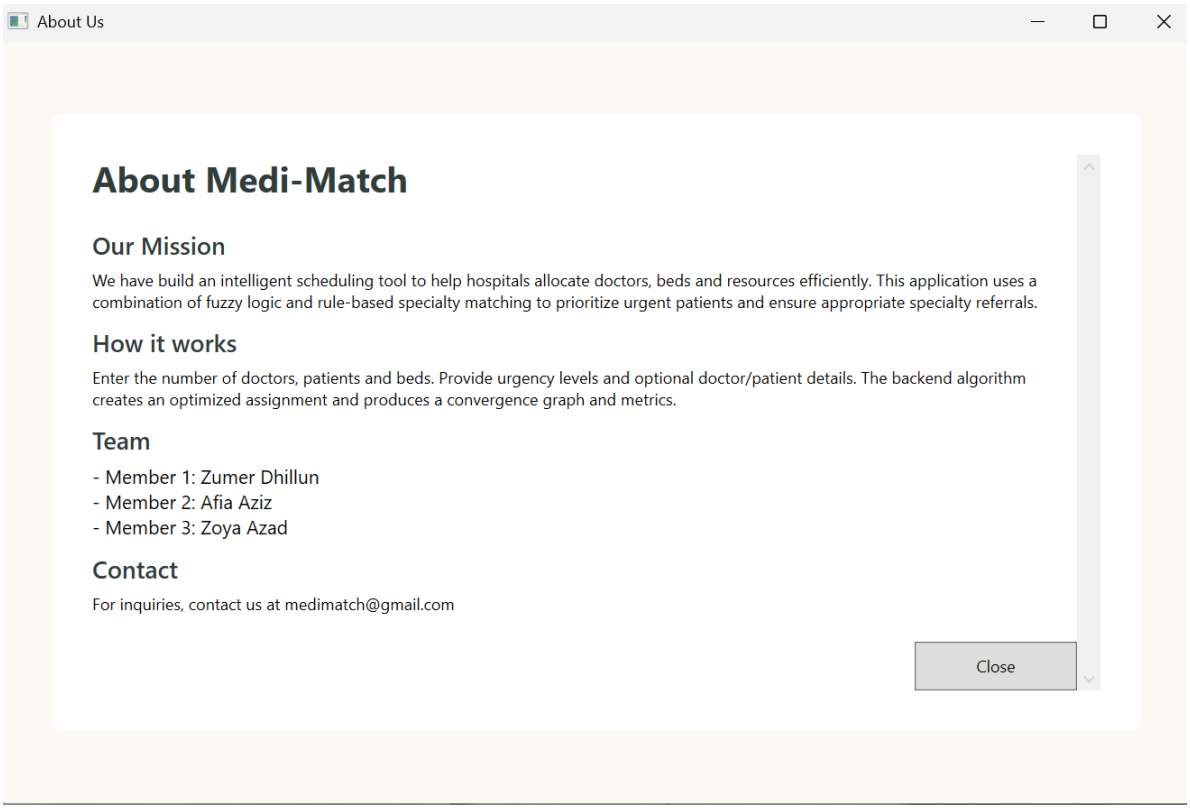
Entry Page:



Home Page:

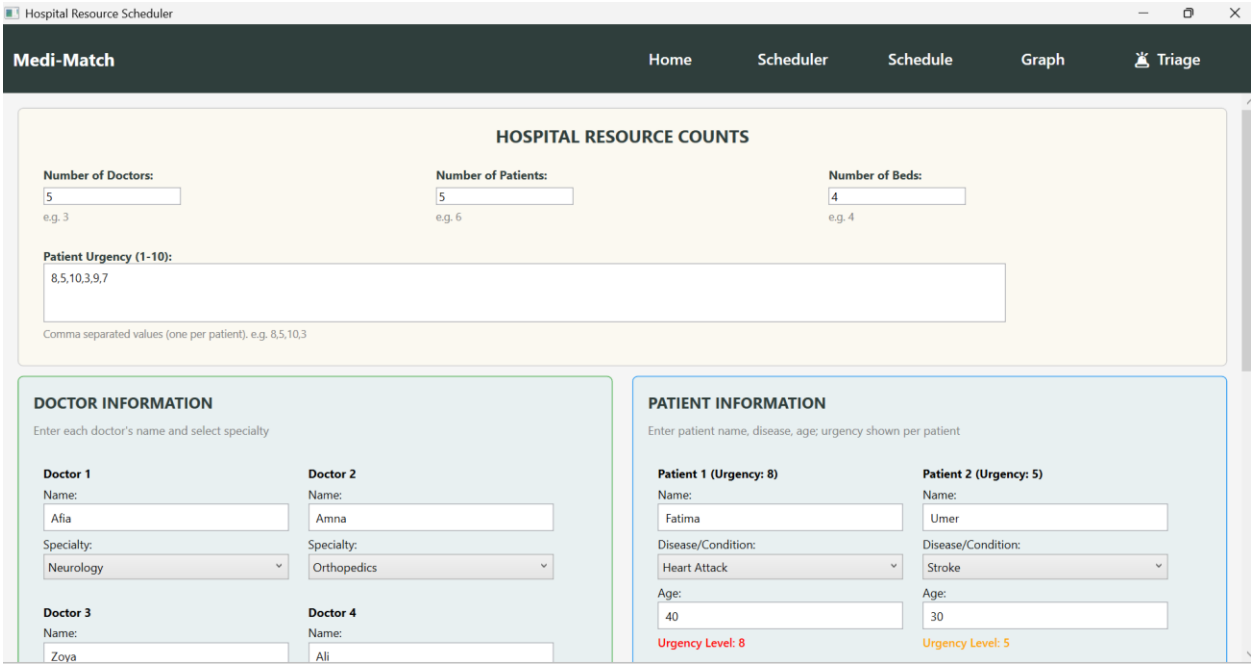


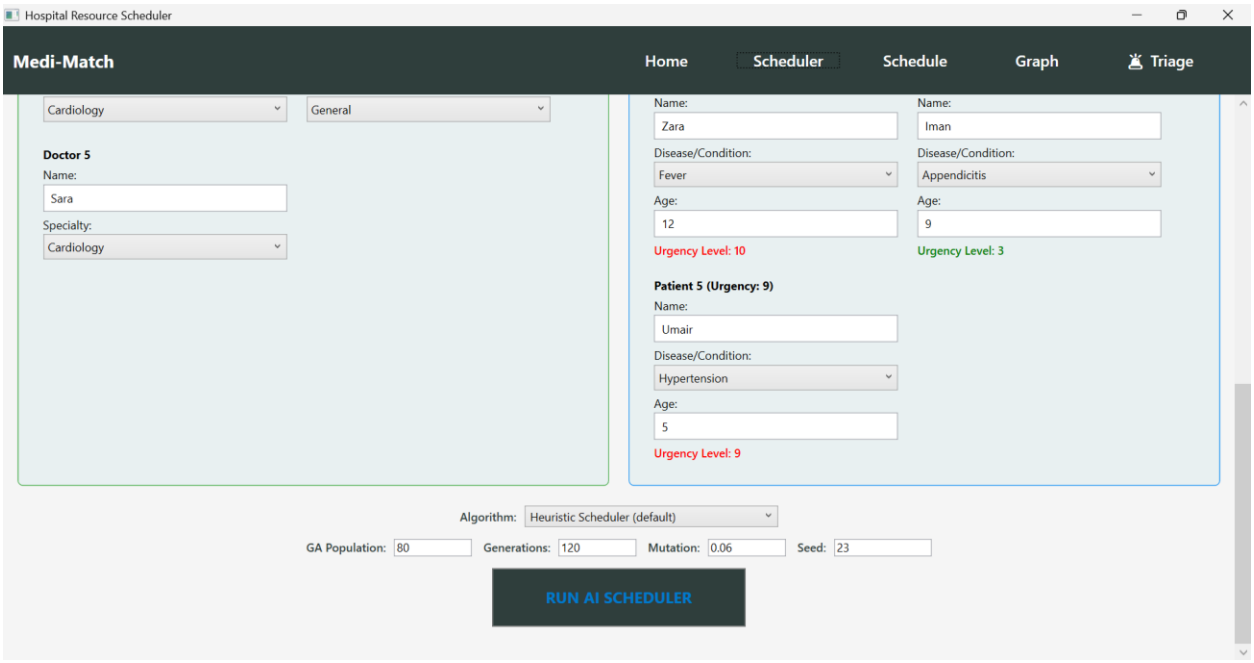
About Us Page:



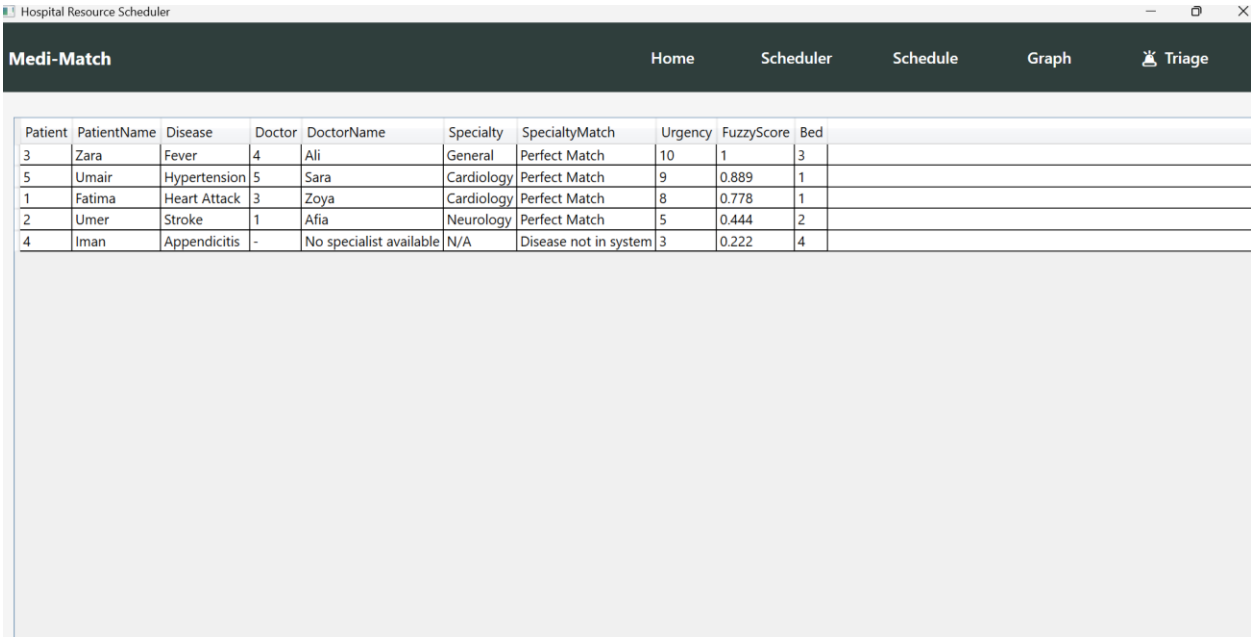
Hospital Resource Schedular Page:

- **5 Doctors**
- **5 Patients**



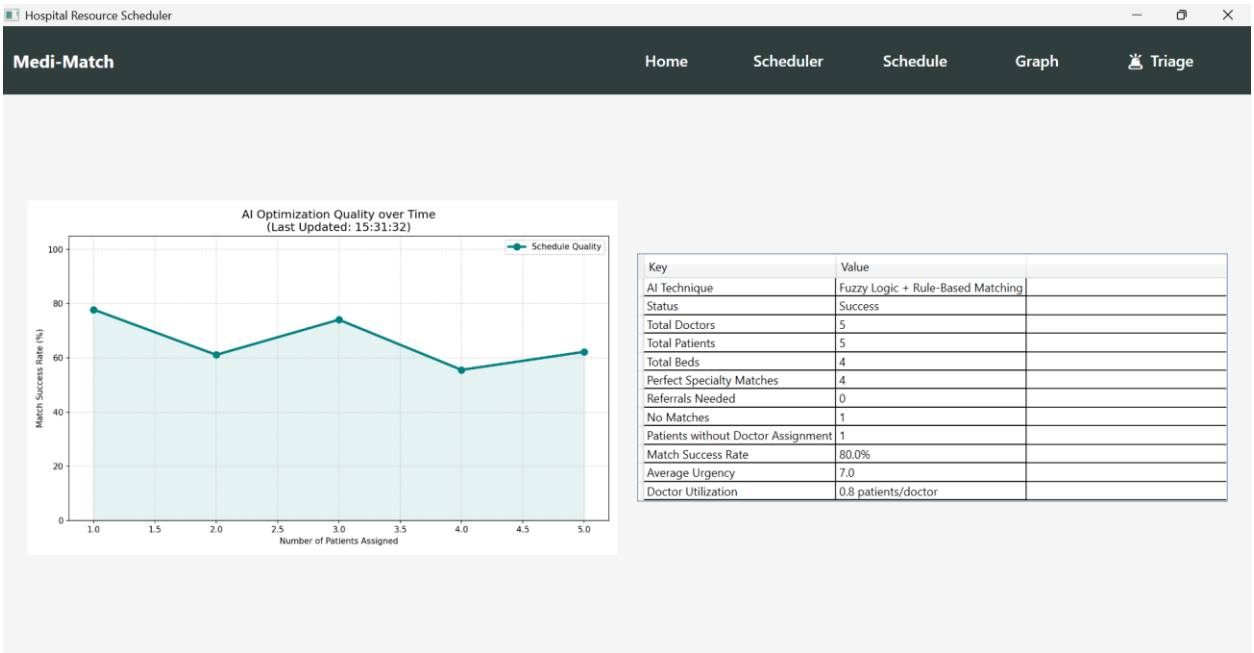


Schedule Page:



Patient	PatientName	Disease	Doctor	DoctorName	Specialty	SpecialtyMatch	Urgency	FuzzyScore	Bed
3	Zara	Fever	4	Ali	General	Perfect Match	10	1	3
5	Umair	Hypertension	5	Sara	Cardiology	Perfect Match	9	0.889	1
1	Fatima	Heart Attack	3	Zoya	Cardiology	Perfect Match	8	0.778	1
2	Umer	Stroke	1	Afia	Neurology	Perfect Match	5	0.444	2
4	Iman	Appendicitis	-	No specialist available	N/A	Disease not in system	3	0.222	4

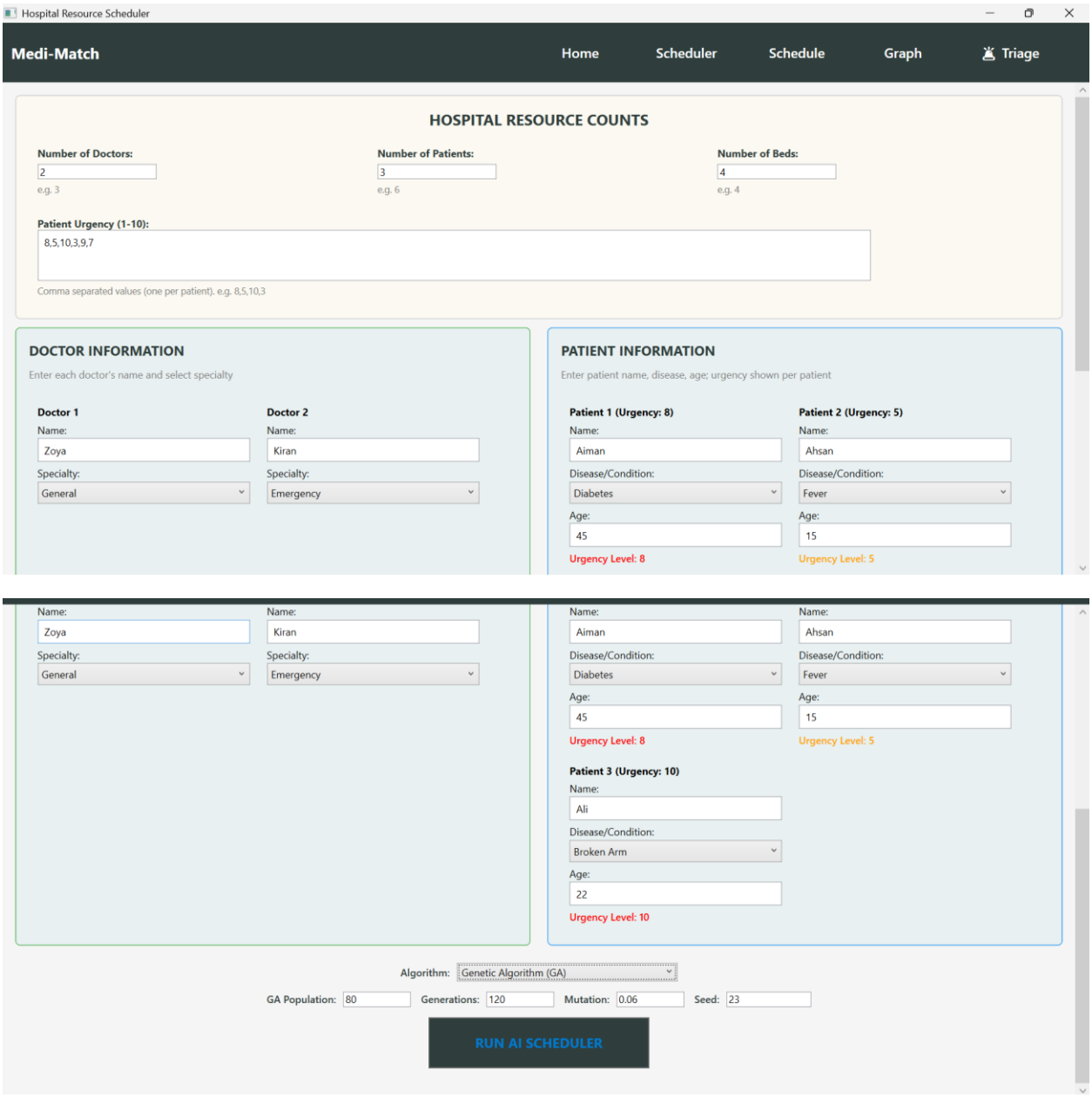
Graph:



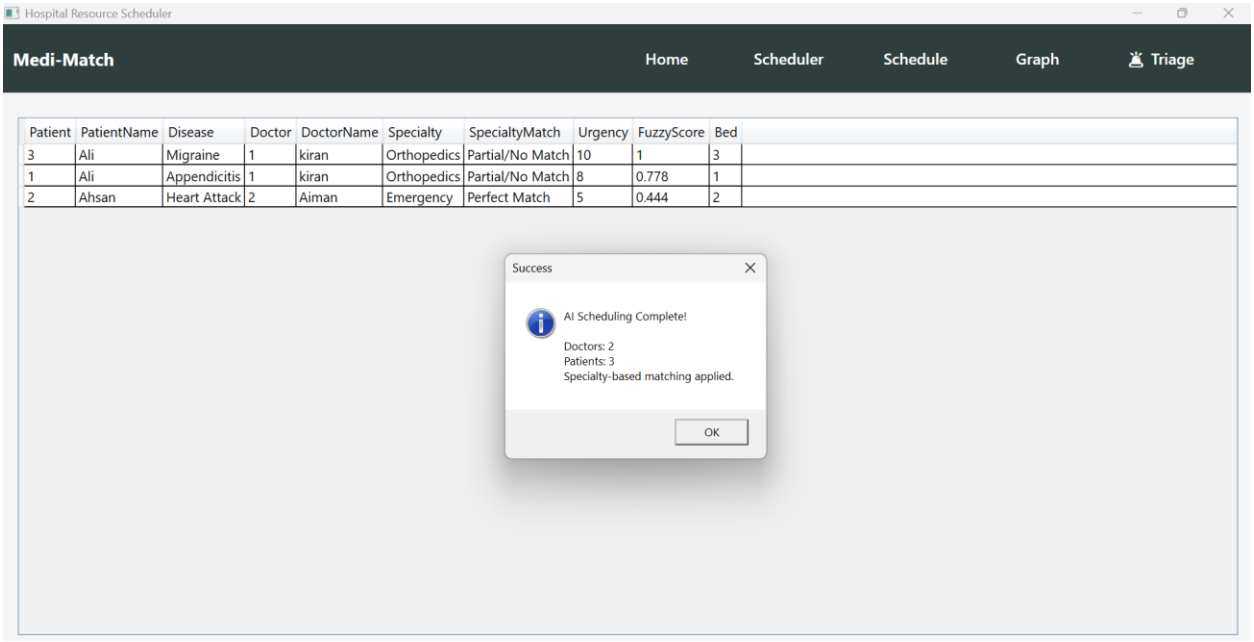
Key	Value
AI Technique	Fuzzy Logic + Rule-Based Matching
Status	Success
Total Doctors	5
Total Patients	5
Total Beds	4
Perfect Specialty Matches	4
Referrals Needed	0
No Matches	1
Patients without Doctor Assignment	1
Match Success Rate	80.0%
Average Urgency	7.0
Doctor Utilization	0.8 patients/doctor

Hospital Resource Schedular Page:

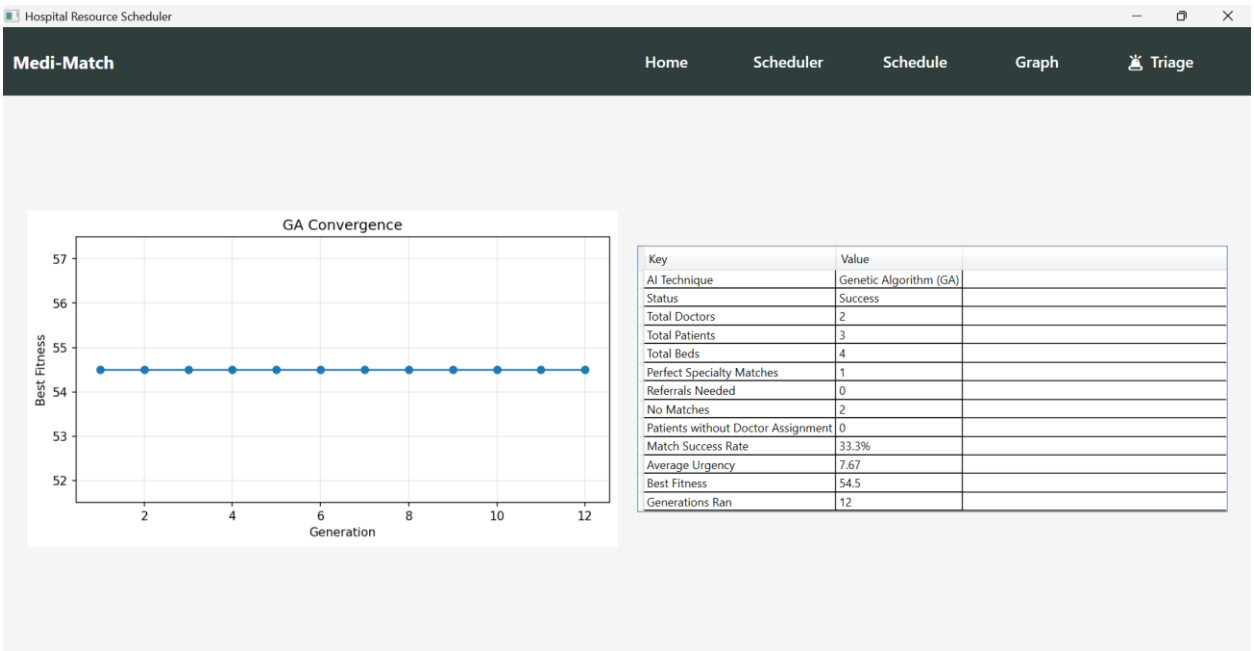
- **2 Doctors**
- **3 Patients**



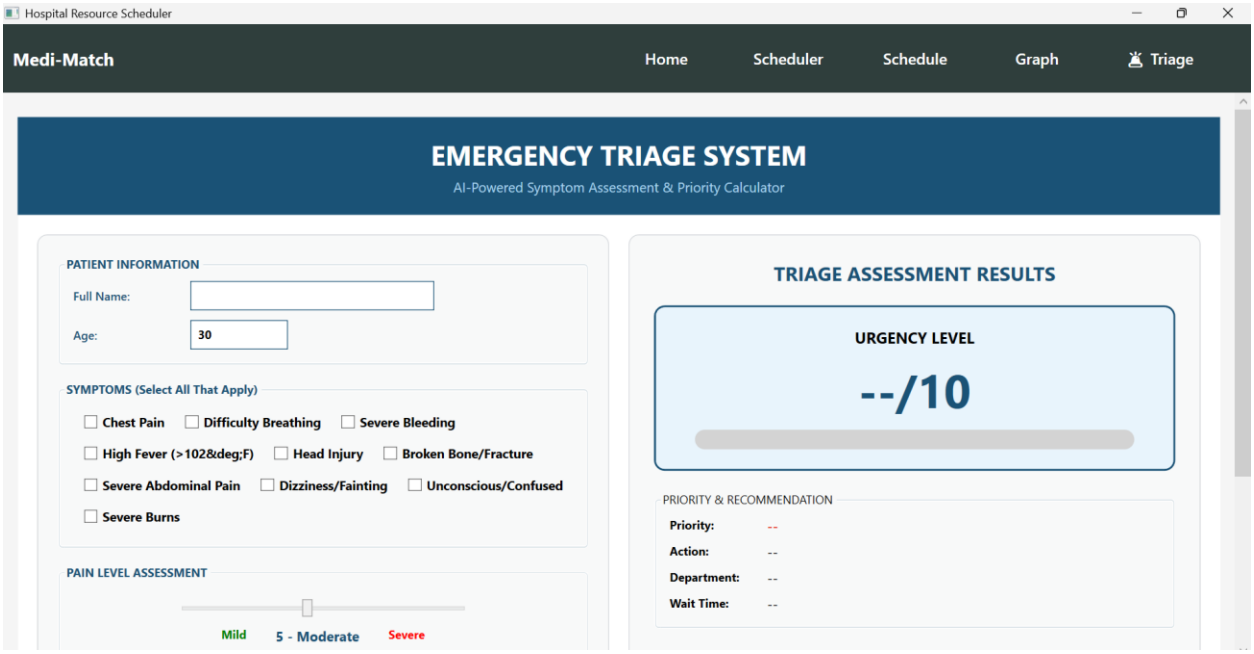
Schedule Page:

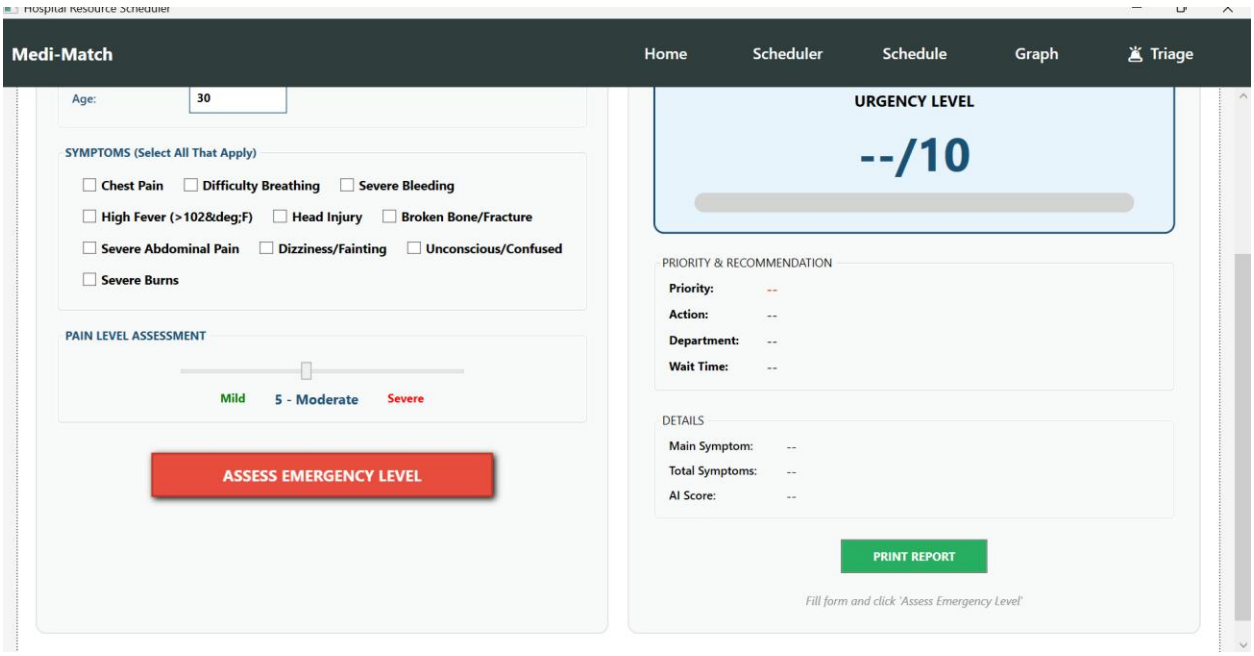


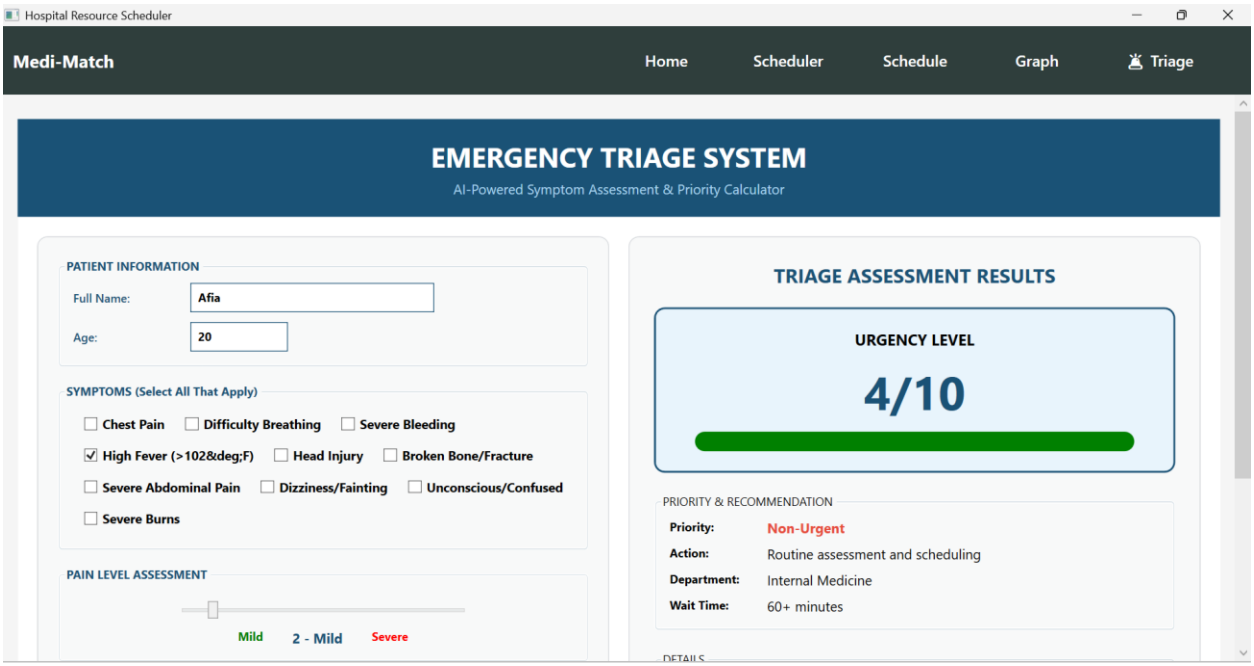
Graph:

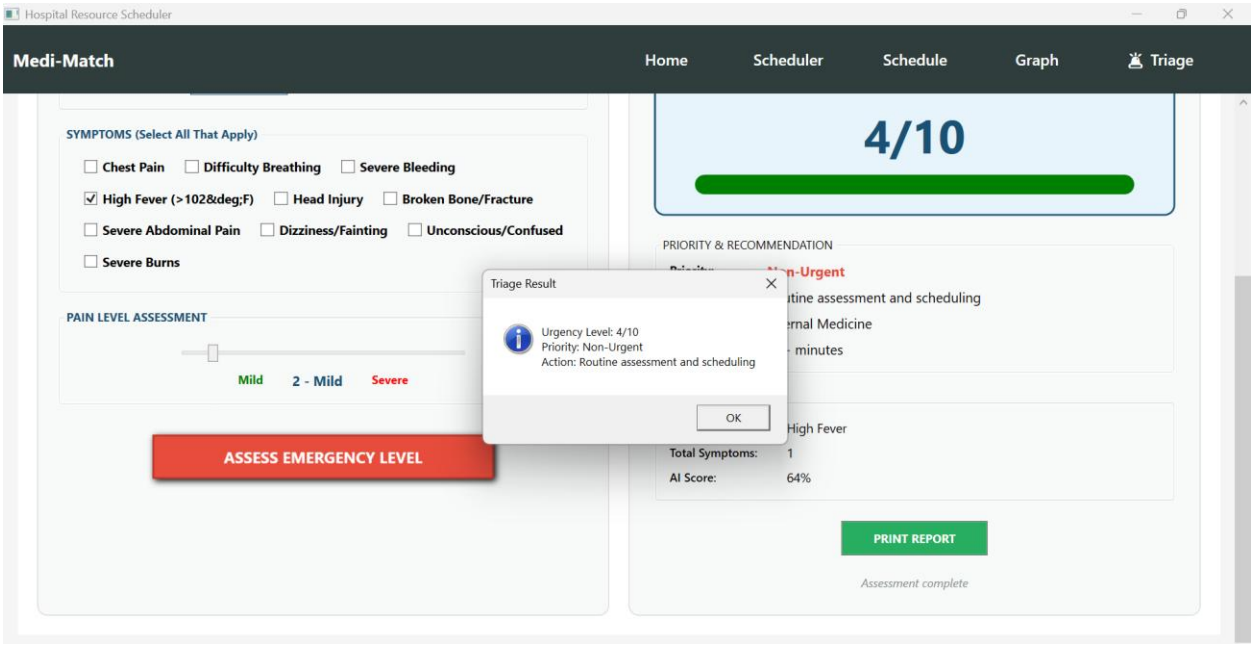


Emergency Triage Page:

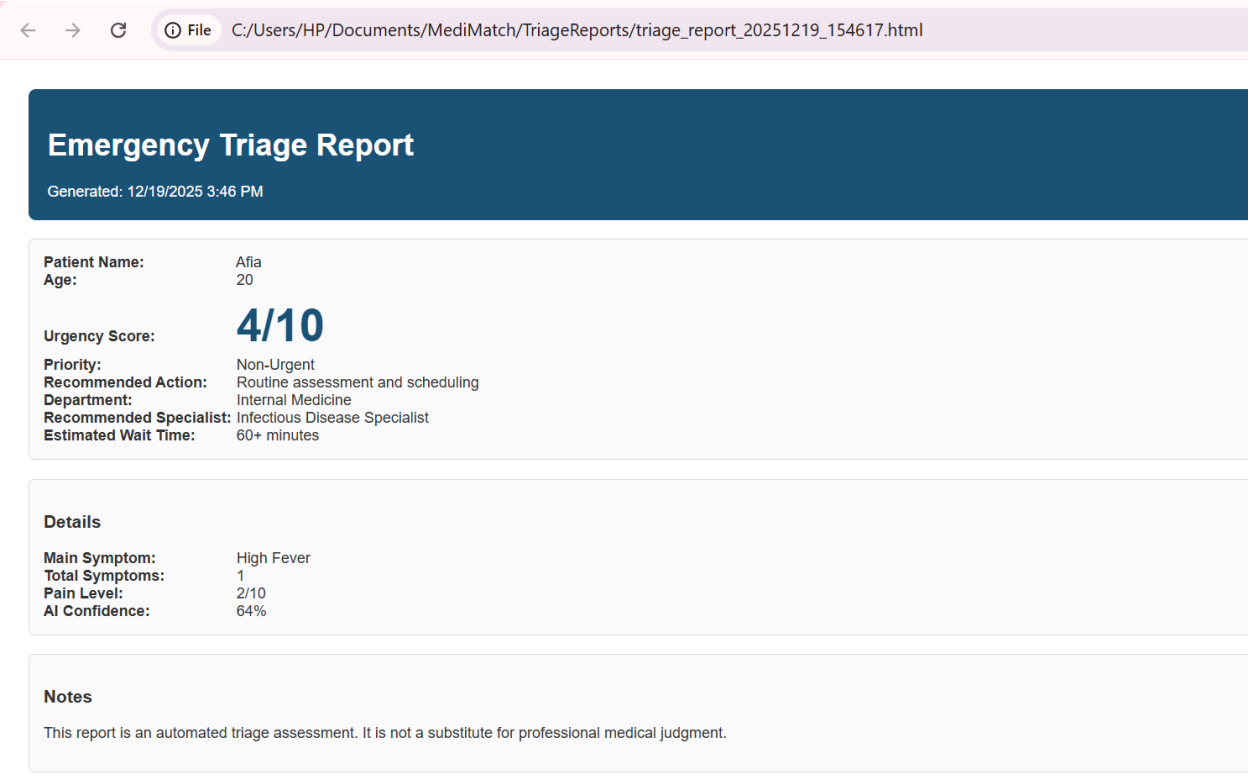





Hospital Resource Scheduler
Medi-Match
Home
Scheduler
Schedule
Graph
Triage
EMERGENCY TRIAGE SYSTEM
AI-Powered Symptom Assessment & Priority Calculator
PATIENT INFORMATION
Full Name:
Afia
Age:
20
SYMPTOMS (Select All That Apply)
Chest Pain
Difficulty Breathing
Severe Bleeding
High Fever (>102°F)
Head Injury
Broken Bone/Fracture
Severe Abdominal Pain
Dizziness/Fainting
Unconscious/Confused
Severe Burns
PAIN LEVEL ASSESSMENT
Mild
2 - Mild
Severe
TRIAGE ASSESSMENT RESULTS
URGENCY LEVEL
4/10
PRIORITY & RECOMMENDATION
Priority:
Non-Urgent
Action:
Routine assessment and scheduling
Department:
Internal Medicine
Wait Time:
60+ minutes


Hospital Resource Scheduler
Medi-Match
Home
Scheduler
Schedule
Graph
Triage
SYMPTOMS (Select All That Apply)
Chest Pain
Difficulty Breathing
Severe Bleeding
High Fever (>102°F)
Head Injury
Broken Bone/Fracture
Severe Abdominal Pain
Dizziness/Fainting
Unconscious/Confused
Severe Burns
PAIN LEVEL ASSESSMENT
Mild
2 - Mild
Severe
ASSESS EMERGENCY LEVEL
Triage Result
Urgency Level: 4/10
Priority: Non-Urgent
Action: Routine assessment and scheduling
OK
4/10
PRIORITY & RECOMMENDATION
Total Symptoms:
1
AI Score:
64%
PRINT REPORT
Assessment complete

Report:


File
C:/Users/HP/Documents/MediMatch/TriageReports/triage_report_20251219_154617.html
Emergency Triage Report
Generated: 12/19/2025 3:46 PM
Patient Name: Afia
Age: 20
Urgency Score: 4/10
Priority: Non-Urgent
Recommended Action: Routine assessment and scheduling
Department: Internal Medicine
Recommended Specialist: Infectious Disease Specialist
Estimated Wait Time: 60+ minutes
Details
Main Symptom: High Fever
Total Symptoms: 1
Pain Level: 2/10
AI Confidence: 64%
Notes
This report is an automated triage assessment. It is not a substitute for professional medical judgment.