

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.

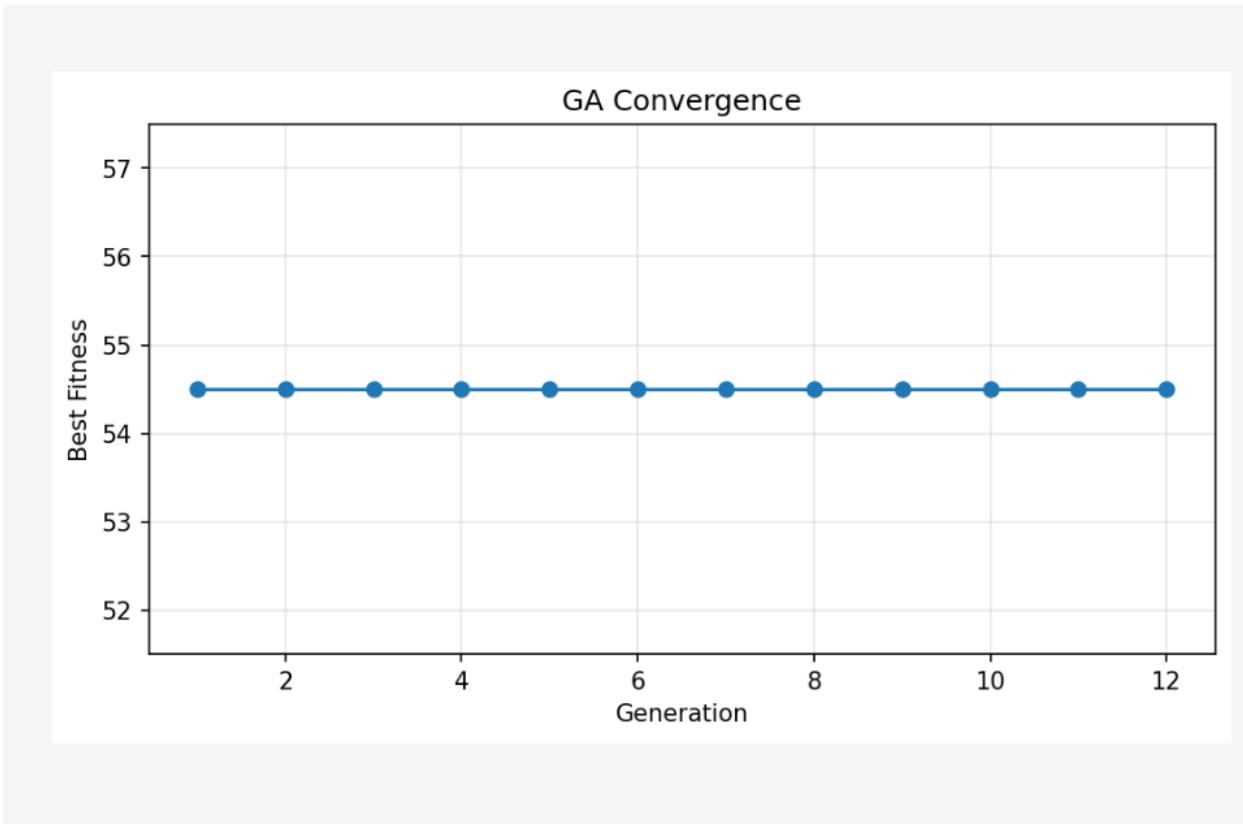
Test Case 2: No Specialist Available (Edge Case)

- **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

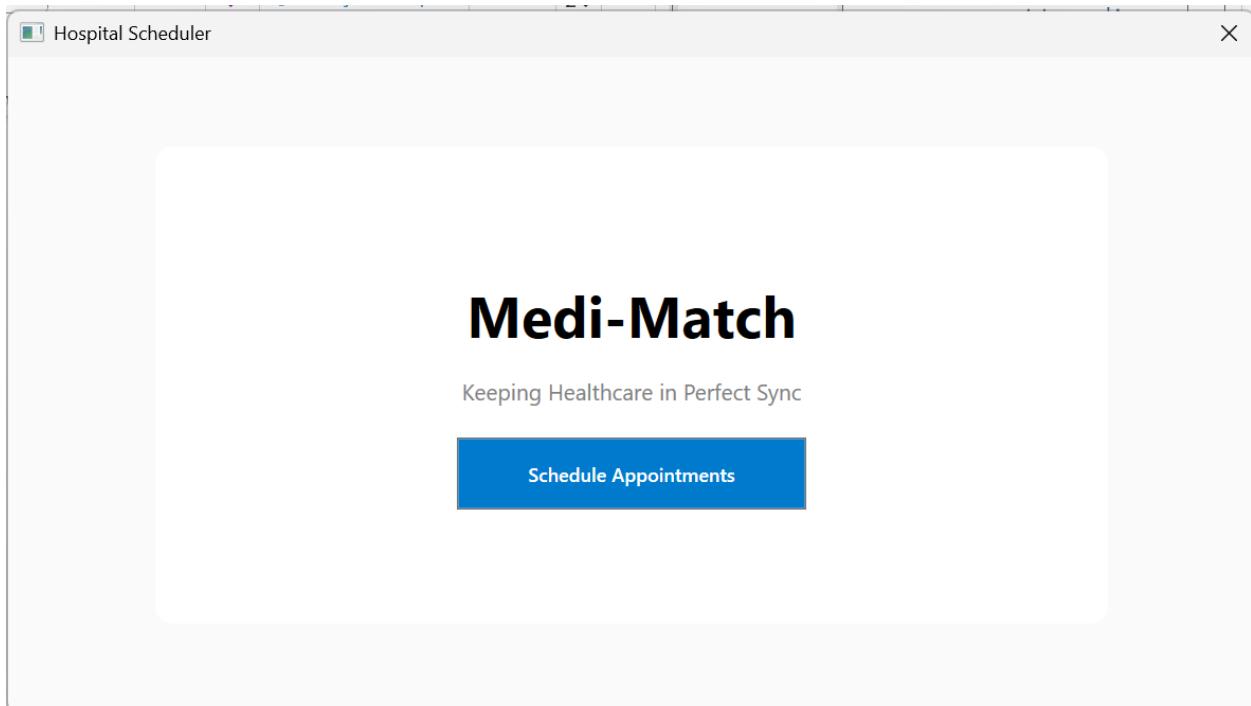
While Medi-Match is robust, it has the following limitations:

- **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.

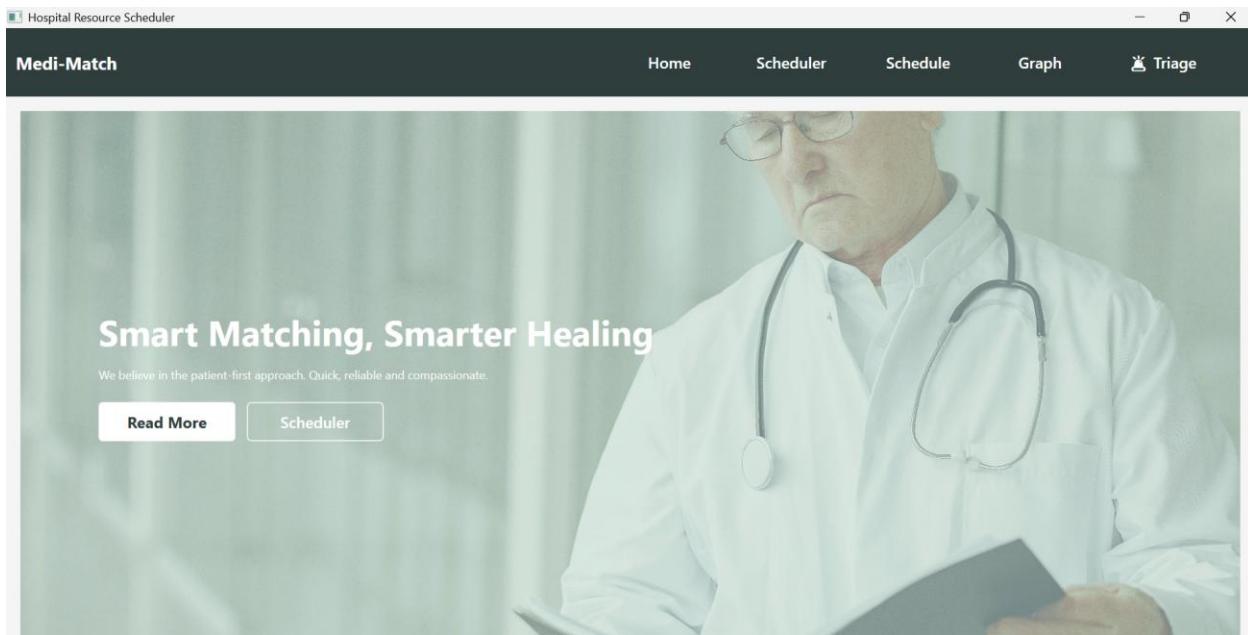
5. Project Output (Screenshots)

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.

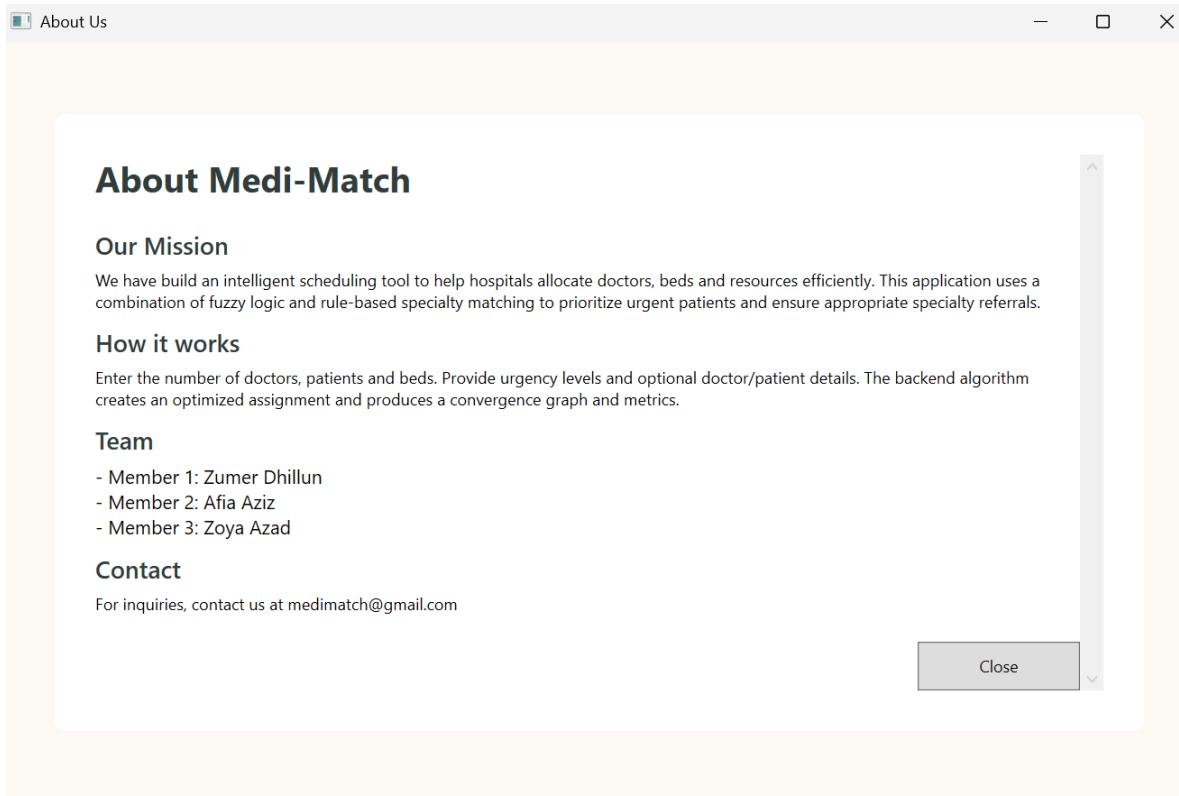
Entry Page:



Home Page:



About Us Page:



Hospital Resource Schedular Page:

- 5 Doctors
- 5 Patients

Hospital Resource Scheduler

Medi-Match

Home Scheduler Schedule Graph Triage

HOSPITAL RESOURCE COUNTS

Number of Doctors:	5 e.g. 3	Number of Patients:	5 e.g. 6	Number of Beds:	4 e.g. 4
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Patient Urgency (1-10):
8,5,10,3,9,7

Comma separated values (one per patient), e.g. 8,5,10,3

DOCTOR INFORMATION
Enter each doctor's name and select specialty

Doctor 1 Name: <input type="text" value="Afia"/>	Doctor 2 Name: <input type="text" value="Amna"/>
Specialty: <input type="text" value="Neurology"/>	Specialty: <input type="text" value="Orthopedics"/>
Doctor 3 Name: <input type="text" value="Zoya"/>	Doctor 4 Name: <input type="text" value="Ali"/>

PATIENT INFORMATION
Enter patient name, disease, age; urgency shown per patient

Patient 1 (Urgency: 8) Name: <input type="text" value="Fatima"/> Disease/Condition: <input type="text" value="Heart Attack"/> Age: <input type="text" value="40"/> Urgency Level: 8	Patient 2 (Urgency: 5) Name: <input type="text" value="Umer"/> Disease/Condition: <input type="text" value="Stroke"/> Age: <input type="text" value="30"/> Urgency Level: 5
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Hospital Resource Scheduler

Medi-Match

Home **Scheduler** Schedule Graph Triage

<input type="text" value="Cardiology"/>	<input type="text" value="General"/>
Doctor 5 Name: <input type="text" value="Sara"/> Specialty: <input type="text" value="Cardiology"/>	Patient 1 (Urgency: 10) Name: <input type="text" value="Zara"/> Disease/Condition: <input type="text" value="Fever"/> Age: <input type="text" value="12"/> Urgency Level: 10
	Patient 2 (Urgency: 5) Name: <input type="text" value="Iman"/> Disease/Condition: <input type="text" value="Appendicitis"/> Age: <input type="text" value="9"/> Urgency Level: 5
	Patient 3 (Urgency: 9) Name: <input type="text" value="Umair"/> Disease/Condition: <input type="text" value="Hypertension"/> Age: <input type="text" value="5"/> Urgency Level: 9

Algorithm:

GA Population: Generations: Mutation: Seed:

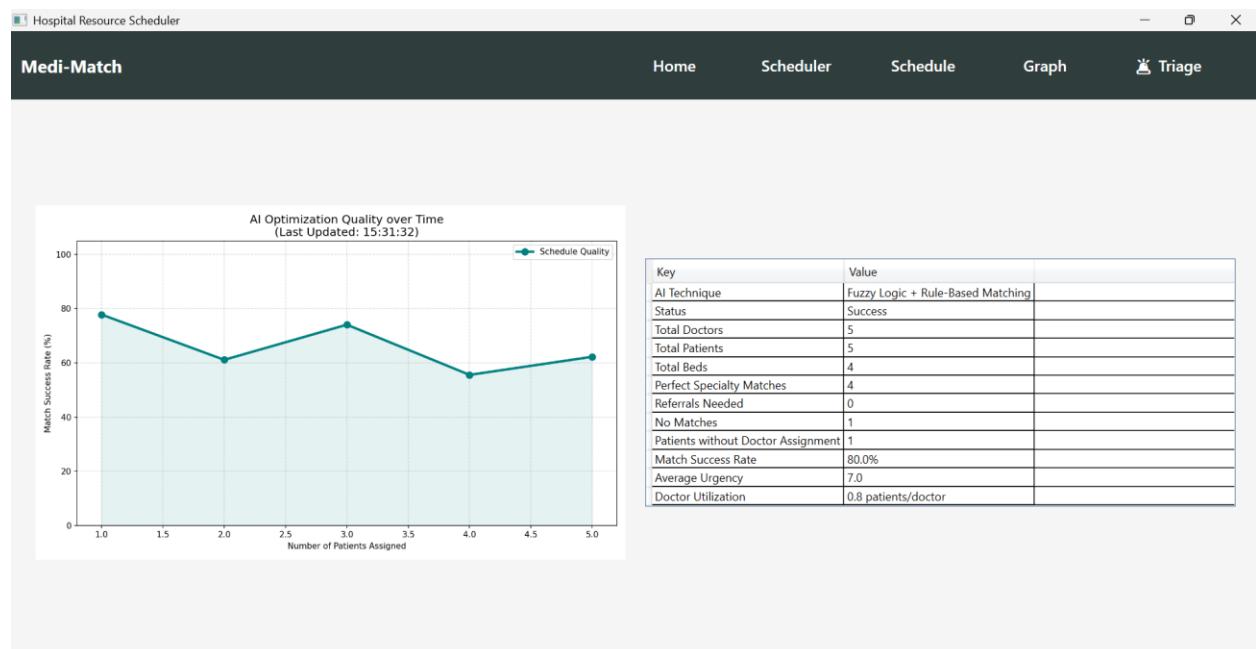
RUN AI SCHEDULER

Schedule Page:

A screenshot of a Windows application window titled "Hospital Resource Scheduler". The main title bar says "Medi-Match". Below the title bar are navigation tabs: Home, Scheduler, Schedule, Graph, and Triage. The "Scheduler" tab is selected. The main content area contains a table with 10 columns and 5 rows of data. The columns are: Patient, PatientName, Disease, Doctor, DoctorName, Specialty, SpecialtyMatch, Urgency, FuzzyScore, and Bed. The data rows are:

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:



Hospital Resource Scheduler Page:

- 2 Doctors
- 3 Patients

Hospital Resource Scheduler

Medi-Match

HOSPITAL RESOURCE COUNTS

Number of Doctors:	Number of Patients:	Number of Beds:
<input type="text" value="2"/> e.g. 3	<input type="text" value="3"/> e.g. 6	<input type="text" value="4"/> e.g. 4

Patient Urgency (1-10):
8,5,10,3,9,7

Comma separated values (one per patient). e.g. 8,5,10,3

DOCTOR INFORMATION
Enter each doctor's name and select specialty

Doctor 1 Name: <input type="text" value="Zoya"/> Specialty: <input type="text" value="General"/>	Doctor 2 Name: <input type="text" value="Kiran"/> Specialty: <input type="text" value="Emergency"/>
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PATIENT INFORMATION
Enter patient name, disease, age; urgency shown per patient

Patient 1 (Urgency: 8) Name: <input type="text" value="Aiman"/> Disease/Condition: <input type="text" value="Diabetes"/> Age: <input type="text" value="45"/> Urgency Level: 8	Patient 2 (Urgency: 5) Name: <input type="text" value="Ahsan"/> Disease/Condition: <input type="text" value="Fever"/> Age: <input type="text" value="15"/> Urgency Level: 5
Patient 3 (Urgency: 10) Name: <input type="text" value="Ali"/> Disease/Condition: <input type="text" value="Broken Arm"/> Age: <input type="text" value="22"/> Urgency Level: 10	

Algorithm:

GA Population: Generations: Mutation: Seed:

RUN AI SCHEDULER

Schedule Page:

The screenshot shows the Medi-Match application interface. At the top, there is a navigation bar with tabs: Home, Scheduler, Schedule, Graph, and Triage. Below the navigation bar is a table titled "Medi-Match" showing patient matching results. The table has columns: Patient, PatientName, Disease, Doctor, DoctorName, Specialty, SpecialtyMatch, Urgency, FuzzyScore, and Bed. The data in the table is as follows:

Patient	PatientName	Disease	Doctor	DoctorName	Specialty	SpecialtyMatch	Urgency	FuzzyScore	Bed
3	Ali	Migraine	1	kiran	Orthopedics	Partial/No Match	10	1	3
1	Ali	Appendicitis	1	kiran	Orthopedics	Partial/No Match	8	0.778	1
2	Ahsan	Heart Attack	2	Aiman	Emergency	Perfect Match	5	0.444	2

In the center of the screen, a modal window titled "Success" displays the message: "AI Scheduling Complete! Doctors: 2 Patients: 3 Specialty-based matching applied." with an "OK" button.

Graph:

The screenshot shows the Medi-Match application interface. At the top, there is a navigation bar with tabs: Home, Scheduler, Schedule, Graph, and Triage. Below the navigation bar is a chart titled "GA Convergence" showing the best fitness over generations. The chart has "Best Fitness" on the Y-axis (ranging from 52 to 57) and "Generation" on the X-axis (ranging from 2 to 12). The data points show a constant fitness value of approximately 54.5 across all generations. To the right of the chart is a summary table with various performance metrics:

Key	Value
AI Technique	Genetic Algorithm (GA)
Status	Success
Total Doctors	2
Total Patients	3
Total Beds	4
Perfect Specialty Matches	1
Referrals Needed	0
No Matches	2
Patients without Doctor Assignment	0
Match Success Rate	33.3%
Average Urgency	7.67
Best Fitness	54.5
Generations Ran	12

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:

Age:

SYMPOTMS (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 Severe

TRIAGE ASSESSMENT RESULTS

URGENCY LEVEL

--/10

PRIORITY & RECOMMENDATION

Priority: --
Action: --
Department: --
Wait Time: --

Hospital Resource Scheduler

Medi-Match

Home Scheduler Schedule Graph **Triage**

Age:

SYMPOTMS (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 Severe

ASSESS EMERGENCY LEVEL

URGENCY LEVEL

--/10

PRIORITY & RECOMMENDATION

Priority: --
Action: --
Department: --
Wait Time: --

DETAILS

Main Symptom: --
Total Symptoms: --
AI Score: --

PRINT REPORT

Fill form and click 'Assess Emergency Level'

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

SYMPOTMS (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

SYMPOTMS (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

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.