

# **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.

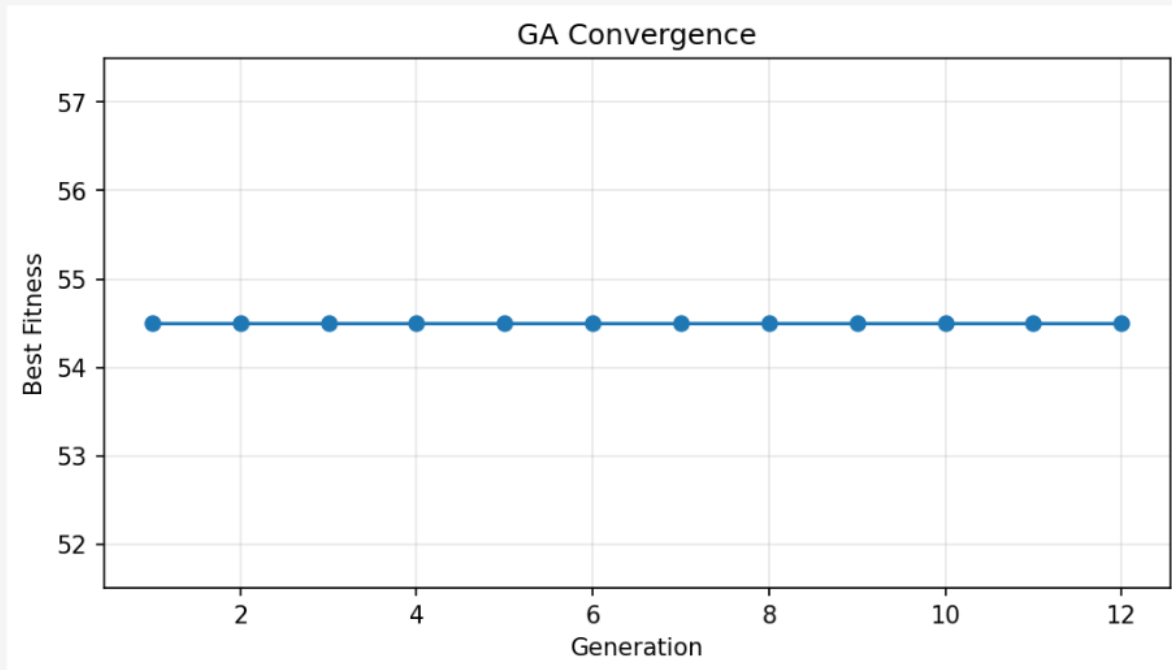
##### Test Case 2: No Specialist Available (Edge Case)

- **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

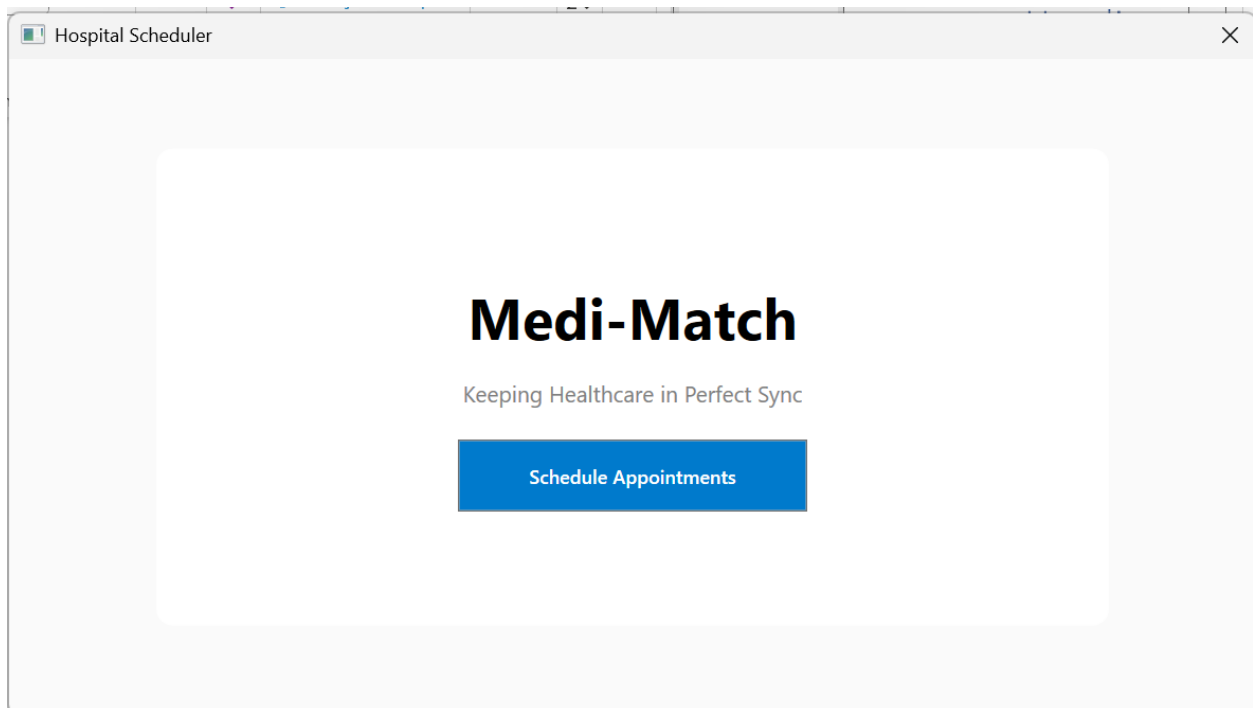
While Medi-Match is robust, it has the following limitations:

- **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.

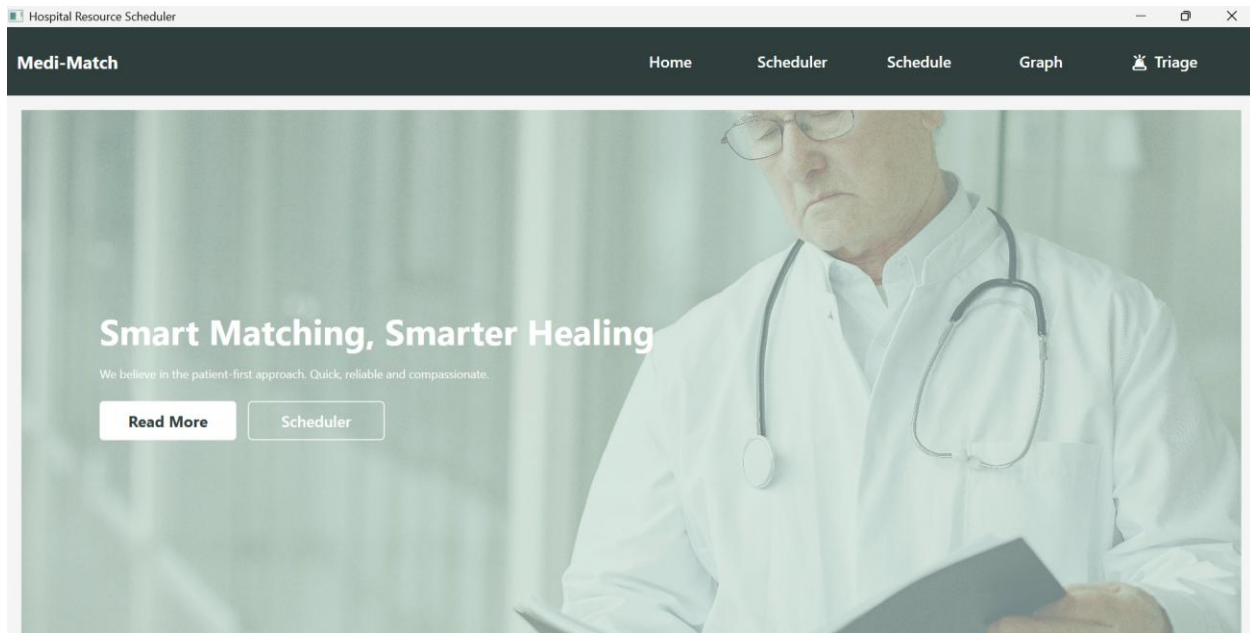
## 5. Project Output (Screenshots)

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.

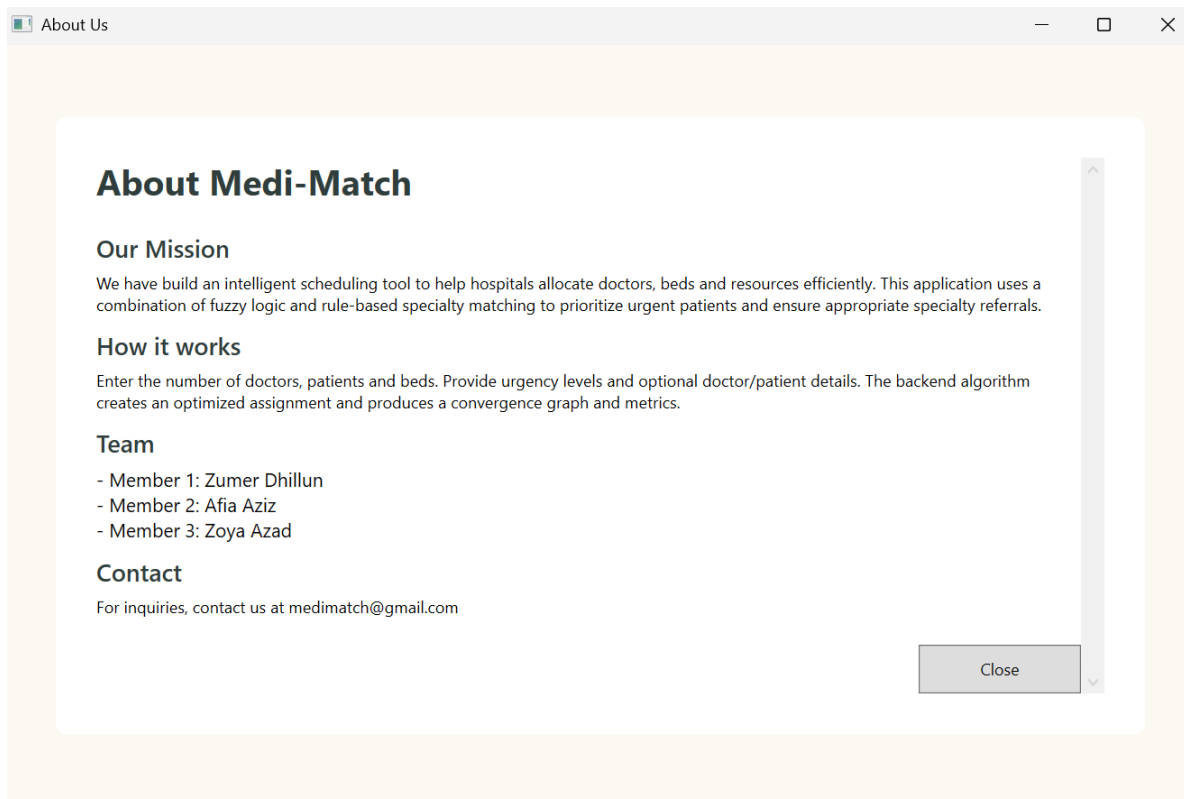
### Entry Page:



## Home Page:



## About Us Page:



## Hospital Resource Scheduler Page:

- 5 Doctors
- 5 Patients

Hospital Resource Scheduler

Medi-Match

HomeSchedulerScheduleGraphTriage

HOSPITAL RESOURCE COUNTS

Number of Doctors:  
5  
e.g. 3

Number of Patients:  
5  
e.g. 6

Number of Beds:  
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:  
Afia

Specialty:  
Neurology

Doctor 2

Name:  
Amna

Specialty:  
Orthopedics

Doctor 3

Name:  
Zoya

Specialty:  
Cardiology

Doctor 4

Name:  
Ali

Specialty:  
General

PATIENT INFORMATION

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

Patient 1 (Urgency: 8)

Name:  
Fatima

Disease/Condition:  
Heart Attack

Age:  
40

Urgency Level: 8

Patient 2 (Urgency: 5)

Name:  
Umer

Disease/Condition:  
Stroke

Age:  
30

Urgency Level: 5

Cardiology

General

Doctor 5

Name:  
Sara

Specialty:  
Cardiology

Patient 3 (Urgency: 10)

Name:  
Zara

Disease/Condition:  
Fever

Age:  
12

Urgency Level: 10

Patient 4 (Urgency: 3)

Name:  
Iman

Disease/Condition:  
Appendicitis

Age:  
9

Urgency Level: 3

Patient 5 (Urgency: 9)

Name:  
Umair

Disease/Condition:  
Hypertension

Age:  
5

Urgency Level: 9

Algorithm: Heuristic Scheduler (default)

GA Population: 80

Generations: 120

Mutation: 0.06

Seed: 23

RUN AI SCHEDULER

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Schedule Page:

Hospital Resource Scheduler

Medi-Match

HomeSchedulerScheduleGraphTriage

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

Medi-Match

HomeSchedulerScheduleGraphTriage

AI Optimization Quality over Time  
(Last Updated: 15:31:32)

Match Success Rate (%)

Number of Patients Assigned

Schedule Quality

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 Scheduler Page:

- 2 Doctors
- 3 Patients

Hospital Resource Scheduler

Medi-Match

HomeSchedulerScheduleGraphTriage

HOSPITAL RESOURCE COUNTS

Number of Doctors:  
  
e.g. 3

Number of Patients:  
  
e.g. 6

Number of Beds:  
  
e.g. 4

Patient Urgency (1-10):  
  
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:

Specialty:  

General

Doctor 2

Name:

Specialty:  

Emergency

PATIENT INFORMATION

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

Patient 1 (Urgency: 8)

Name:

Disease/Condition:  

Diabetes

Age:

Urgency Level: 8

Patient 2 (Urgency: 5)

Name:

Disease/Condition:  

Fever

Age:

Urgency Level: 5

Name:

Specialty:  

General

Name:

Specialty:  

Emergency

Patient 1 (Urgency: 8)

Name:

Disease/Condition:  

Diabetes

Age:

Urgency Level: 8

Patient 2 (Urgency: 5)

Name:

Disease/Condition:  

Fever

Age:

Urgency Level: 5

Patient 3 (Urgency: 10)

Name:

Disease/Condition:  

Broken Arm

Age:

Urgency Level: 10

Algorithm: Genetic Algorithm (GA)

GA Population:

Generations:

Mutation:

Seed:

RUN AI SCHEDULER

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Schedule Page:

Hospital Resource Scheduler

Medi-MatchHomeSchedulerScheduleGraphTriage

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

Success

AI Scheduling Complete!

Doctors: 2  
Patients: 3  
Specialty-based matching applied.

OK

Graph:

Hospital Resource Scheduler

Medi-MatchHomeSchedulerScheduleGraphTriage

GA Convergence

Generation	Best Fitness
1	54.5
2	54.5
3	54.5
4	54.5
5	54.5
6	54.5
7	54.5
8	54.5
9	54.5
10	54.5
11	54.5
12	54.5

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

Hospital Resource Scheduler

Medi-Match

HomeSchedulerScheduleGraphTriage

EMERGENCY TRIAGE SYSTEM

AI-Powered Symptom Assessment & Priority Calculator

PATIENT INFORMATION

Full Name:

Age:

30

SYMPTOMS (Select All That Apply)

☐ Chest Pain

☐ Difficulty Breathing

☐ Severe Bleeding

☐ High Fever (>102&deg;F)

☐ Head Injury

☐ Broken Bone/Fracture

☐ Severe Abdominal Pain

☐ Dizziness/Fainting

☐ Unconscious/Confused

☐ Severe Burns

PAIN LEVEL ASSESSMENT

Mild5 - ModerateSevere

TRIAGE ASSESSMENT RESULTS

URGENCY LEVEL

--/10

PRIORITY & RECOMMENDATION

Priority:

--

Action:

--

Department:

--

Wait Time:

--

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Hospital Resource Scheduler

Medi-Match

HomeSchedulerScheduleGraphTriage

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&deg;F)

☐ Head Injury

☐ Broken Bone/Fracture

☐ Severe Abdominal Pain

☐ Dizziness/Fainting

☐ Unconscious/Confused

☐ Severe Burns

PAIN LEVEL ASSESSMENT

Mild2 - MildSevere

TRIAGE ASSESSMENT RESULTS

URGENCY LEVEL

4/10

PRIORITY & RECOMMENDATION

Priority: Non-Urgent

Action: Routine assessment and scheduling

Department: Internal Medicine

Wait Time: 60+ minutes

DETAILS

Hospital Resource Scheduler

Medi-Match

HomeSchedulerScheduleGraphTriage

SYMPTOMS (Select All That Apply)

☐ Chest Pain

☐ Difficulty Breathing

☐ Severe Bleeding

☒ High Fever (>102&deg;F)

☐ Head Injury

☐ Broken Bone/Fracture

☐ Severe Abdominal Pain

☐ Dizziness/Fainting

☐ Unconscious/Confused

☐ Severe Burns

PAIN LEVEL ASSESSMENT

Mild2 - MildSevere

ASSESS EMERGENCY LEVEL

TRIAGE ASSESSMENT RESULTS

4/10

PRIORITY & RECOMMENDATION

Priority: Non-Urgent

Action: Routine assessment and scheduling

Department: Internal Medicine

Wait Time: 60+ minutes

Total Symptoms: 1

AI Score: 64%

PRINT REPORT

Assessment complete

Triage Result

Urgency Level: 4/10

Priority: Non-Urgent

Action: Routine assessment and scheduling

OK

Report:

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.