



Medical Diagnosis Expert System

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INTRODUCTION



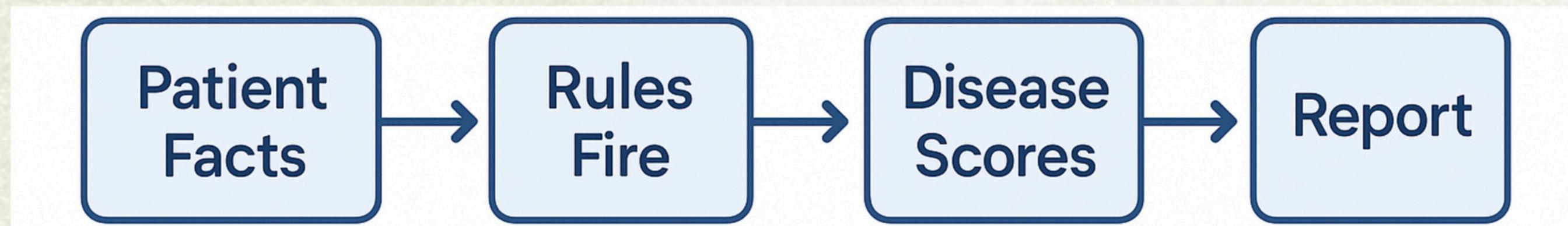
The Medical Diagnosis Expert System is an AI-driven tool designed to assist healthcare professionals in diagnosing diseases based on patient symptoms and medical history. It uses artificial intelligence (AI) techniques, mainly expert systems and rule-based reasoning, to simulate the decision-making ability of human medical experts.

The system works by collecting patient information such as symptoms, medical history, and test results. It then applies its knowledge base (containing medical facts, rules, and past case data) along with an inference engine (the reasoning mechanism) to analyze the input and suggest possible diagnoses or medical advice.

CORE IDEA

Core Workflow of the system:

- 1. takes patient facts such as symptoms, risk factors, and lab results.
- 2. It applies medical rules.
- 3. If rules fire, they increase the certainty score of diseases.
- 4. the system generates a report with possible diagnoses, explanations, and test recommendations.



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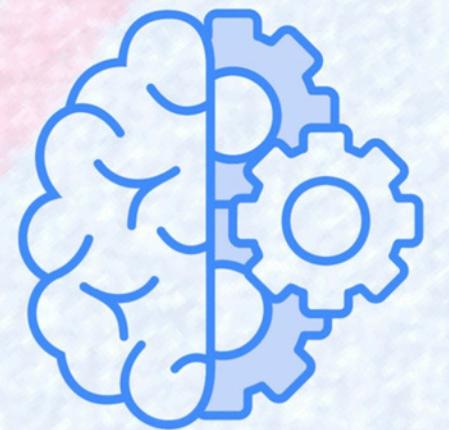
Knowledge Representation



- Diseases stored with:
 - Typical symptoms
 - Risk factors
 - Tests
 - Red flags

Rules: IF-THEN with certainty weights

Rules connect these features to diseases using IF-THEN logic.



Logic Programming & Rules

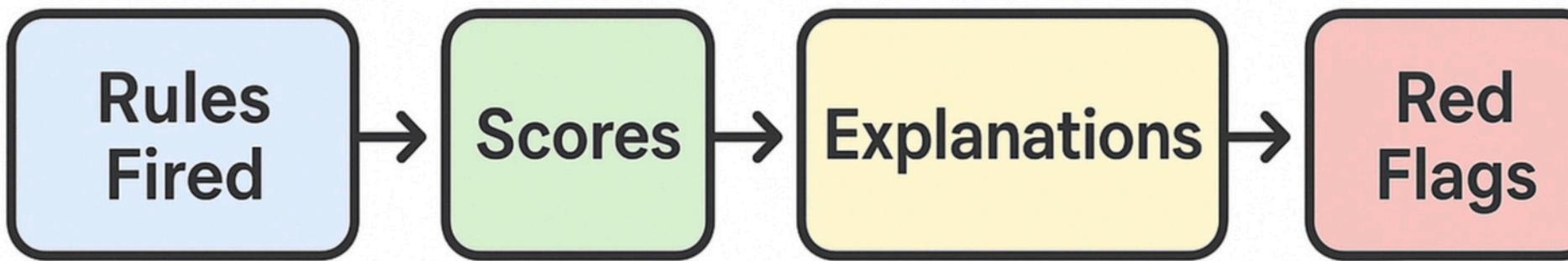


Example Rule:

IF fever + myalgia + headache + dry cough
THEN Influenza (certainty = 0.7)

```
# Influenza
Rule(
    name="flu_core",
    conditions=[has("fever"), has("myalgia"), has("headache"), has("dry_cough")],
    conclusion=("influenza", 0.7),
    why="Abrupt fever + myalgia + headache + dry cough are hallmark of influenza."
),
Rule(
    name="flu_season_risk",
    conditions=[has("fever"), has("cough"), risk("seasonal_outbreak")],
    conclusion=("influenza", 0.3),
    why="Cough with fever during seasonal outbreak increases odds of influenza."
),
```

Inference Engine



It evaluates all the rules against the patient's data.

- When conditions match, the rule fires and adds to a disease score.
- Multiple rules can combine, increasing confidence.
- It also checks red flags like low oxygen or bleeding.
- And finally, it ranks the diseases and prepares explanations.



Explainability



- Fired rules are listed.
- Shows “why” each diagnosis was suggested.
- Red flags highlighted for urgent care.

scores: Dict[str, float] = {}

explanations: Dict[str, List[Tuple[str, str, float]]] = {}

fired_rules: List[str] = []

Dengue Fever | Score: 0.30
Summary: Acute febrile illness with headache, retro-orbital pain, myalgia, rash; warning signs around day 3-7.
Typical risks: mosquito_exposure, outbreak_area
Typical symptoms: fever, headache, rash, myalgia, retro_orbital_pain
Why (fired rules):
- [dengue_warning_platelet] +0.35: Day 3-7 with thrombocytopenia is compatible with dengue warning phase.
Suggested next steps / tests:
- NS1 (day 1-5)
- IgM/IgG (after day 5)
- CBC for platelet, hematocrit

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TIMCLINIC



Week 1–3: Research & Planning

Week 4–6: Knowledge base design, core logic, UI flow

Week 7: Implementation, rules + certainty factor add

Week 8: Testing, output validation, refine diagnosis

Week 9: Add symptom suggestions, confidence scoring

Week 10: Report, slides, documentation

Week 11–12: Demo & submission

FUTURE WORK



- Integrate Machine Learning to improve predictions for complex cases.
- Enable NLP symptom input for free-text patient descriptions.
- Support dynamic updates to the knowledge base with new diseases and rules.
- Develop a Web/Mobile interface for easy clinical access. Integrate with EHR systems for automatic patient data retrieval.
- Conduct clinical validation to refine accuracy and usability.



CONCLUSION

The Medical Diagnosis Expert System supports clinicians by providing differential diagnoses, red flag alerts, and test recommendations based on patient symptoms, vitals, and history. Its rule-based, explainable reasoning ensures transparency and trust, while the modular knowledge base allows easy expansion. This AI-driven system demonstrates the potential to enhance clinical decision-making, improve patient outcomes, and serve as an educational tool in healthcare.



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**THANK YOU FOR YOUR
ATTENTION**

