

Courtroom Simulation with AI Agents - 8 Week Plan

Week 1: Planning & Setup

- Finalize scope & roles (Judge, Prosecutor, Defender)
- Choose backend (Node.js or Python FastAPI)
- Create basic React frontend layout
- Setup GitHub repo + folder structure
- Define JSON schema for a "case"

Resources:

- React Setup: <https://react.dev/learn>
- FastAPI Docs: <https://fastapi.tiangolo.com/>

Week 2: File Upload + Text Extraction

- Build file upload UI (`.pdf`, `.docx`, `.jpg`, `.png`)
- Backend route for receiving files
- Extract text using: PyMuPDF, python-docx, pytesseract

Resources:

- PDF: <https://github.com/pymupdf/PyMuPDF>
- DOCX: <https://github.com/python-openxml/python-docx>
- OCR: <https://github.com/madmaze/pytesseract>

Week 3: Legal Knowledge Base + Rules Engine

- Convert IPC/CrPC into structured format
- Define simple rules in JSON
- Create mock criminal cases
- Retrieve relevant law sections from input

Resources:

- Indian Kanoon: <https://indiankanoon.org/>

Week 4: AI Agent Architecture

- Create BaseAgent class

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- Build ProsecutorAgent, DefenseAgent, JudgeAgent
- Load knowledge base + facts into arguments

Resources:

- <https://realpython.com/python-ai/>
- <https://github.com/aimacode/aima-python>

Week 5: Turn-based Courtroom Logic

- Define courtroom flow: opening -> arguments -> evidence -> rebuttal -> verdict
- Add turn-based logic
- Allow agents to refer to laws/evidence

Resources:

- State Machines: <https://xstate.js.org/docs/>

Week 6: Judge AI + Verdict Generator

- Judge scores arguments
- Apply legal rules -> generate verdict
- Explain logic ("thinking process")

Resources:

- Interpretable ML Book: <https://christophm.github.io/interpretable-ml-book/>

Week 7: Reporting & Analysis

- Generate report after case: outcome, laws, evidence
- Show argument strength
- Use `react-flow` or `chart.js` for visualizations

Resources:

- <https://reactflow.dev/>
- <https://www.chartjs.org/>

Week 8: UI Polish + Testing

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- Polish frontend (court layout, avatars)
- Final testing with full simulations
- Write README and deploy

Resources:

- Deploy: Render, Railway, Vercel