SAMPLE 2: AI-Driven Diabetes Risk Screening for Female Patients in a Pharmacy Portal

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🧠 Overview

Your pharmacy portal connects:

- 👩‍⚕️ **Doctors and Clinics**
- 👩 **Female Patients**
- 💊 **Pharmacies (physical & online)**

We introduce an **AI module** — powered by a neural network trained on the Pima Indians dataset — that **predicts diabetes risk in female patients** directly within the portal experience.

🎯 Goal

To transform your **pharmacy platform** into a proactive health hub that doesn't just sell medicines, but also **prevents disease** by offering **risk assessments, alerts, and targeted care tools** — all through AI.

1. Patient Profile Created or Synced

- A woman visits a partnered clinic or registers on your pharmacy portal.
- Vitals like Glucose, BMI, Pregnancies, Insulin, etc., are entered or synced from EHRs.

2. Diabetes Risk Prediction Triggered

- Our custom ANN model predicts whether she is likely diabetic (Outcome: 0 or 1).

3. Portal Response Based on Prediction:

User Type	**What Happens**
Doctor	Receives a "High Risk" flag on patient dashboard for follow-up
Patient	Gets notified to consult a clinic or take a diagnostic test
Pharmacy	Recommends preventative products: glucose meters, low-sugar foods, supplements

4. Behavioral Loop

- High-risk patients get regular portal nudges, coupons for tests, and curated health articles
- Clinics get reports on population risk trends
- Pharmacies adjust diabetic drug inventory intelligently

📊 Why This Dataset?

Pima Indians Dataset contains 768 rows of real-world health metrics from adult females aged 21+.

We chose it because:

- It's publicly trusted and medically validated
- Focuses on female patients only, which fits our target users

- Contains features like glucose, insulin, BMI, and family history — easily collected at point of sale or clinic intake

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🔁 Model Evolution: From Random Forest to Neural Network

Phase 1: Random Forest

- Fast to implement
- Accuracy: ~71%
- Lacked depth in learning subtle relationships
- Couldn't generalize well to edge cases

Phase 2: ANN (Our Custom Deep Learning Model)

- Multi-layer neural network with dropout regularization
- Accuracy improved to ~83%
- Captures complex, nonlinear patterns (e.g., how age + insulin + BMI combine)
- Learns feature interactions that RF cannot

Conclusion: ANN is more suitable for real-world, noisy, non-linear clinical data.

💼 Value Proposition for Your Pharmacy Business

Stakeholder	Value from AI Module
Patients (Women)	Early screening → less risk → stronger loyalty to portal
Doctors	Decision support → better care outcomes
Pharmacy Portal	Smart recommendations → better conversion & product upsell
Clinical Labs	Get referred patients via screening triggers
Inventory Team	Demand prediction → optimize diabetic medicine stock

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🔗 Technical Integration

- Model hosted via TensorFlow Serving or FastAPI
- REST API accepts 8 fields: Pregnancies, Glucose, BloodPressure, SkinThickness, Insulin, BMI, DiabetesPedigreeFunction, Age
- Returns binary prediction (Likely Diabetic / Not Likely)
- Can be integrated into:
    - Patient registration flow
    - Doctor dashboard
    - Pharmacy recommendation engine

🧭 Example Scenario

👩 Maria, 34, signs up to your pharmacy portal for contraceptives.
Her basic vitals are entered via clinic sync: Glucose = 142, BMI = 32.4, Pregnancies = 2.
The ANN model flags her as high risk for diabetes.

➤ The doctor sees a flag in her profile and recommends a formal test.
➤ Maria receives a health alert and a 10% discount on diagnostic testing.
➤ Pharmacy recommends a glucose meter and a women's wellness pack.
➤ If test confirms diabetes, pharmacy suggests metformin and lifestyle guides.

Expansion Possibilities

- Predict gestational diabetes in pregnant patients (add pregnancy week tracking)
- Track outcomes and retrain model with local data
- Integrate SMS/email health nudges into the portal
- Add explainability features (e.g., why the model gave this risk)