Harmonizing Health and Machine - Mastitis Detection

Scenario 1: Early Illness Detection in Farm Animals

Overview :

The system detects mastitis early with minimal farmer input. It provides a simple UI, risk classification, and generates documentation for farm/vet records.

Project Goals :

Enable early mastitis detection, provide simple and clear UI, deliver human-friendly explanations, support batch inference, and allow PDF export for documentation.

Key Features :

Farmer-minimal input only; Single-screen Streamlit UI; Configurable thresholds; Risk banner visualization; Explanation panel; PDF summary export; Batch CSV inference; Modular ML pipeline.

Business & Social Impact :

Improves animal welfare, reduces costs, minimizes antibiotic usage, empowers farmers with actionable tools, and supports record-keeping.

Extensibility :

Can be extended to include behavioral/environmental features, IoT data ingestion, SMS/ WhatsApp alerting, and other diseases/species.

Project Structure :

File/Folder	Description
requirements.txt	Python dependencies
config/config.yaml	Configuration for model, thresholds, and drop columns
src/utils.py	Helpers for YAML/JSON
src/data_loaders.py	Data loading and normalization
src/preprocess.py	Preprocessing for numeric & categorical features
src/train.py	Training pipeline
src/risk.py	Risk mapping functions
app/streamlit_app.py	Streamlit web app for predictions
data/clinical_mastitis_cows_version1.csv	Example dataset
models/	Stores trained models and artifacts

Workflow :

The mastitis prediction system is initiated when a farmer enters key observational data for a cow, including its temperature, the appearance of its milk, and the hardness and pain of the udder. This information is then processed by a predictive model that calculates the probability of the cow having mastitis. The resulting probability score is mapped into one of four risk levels: LOW, MEDIUM, HIGH, or URGENT. This categorized risk is then displayed on the user interface through a clear risk banner, accompanied by a summary of the situation and an interpretation of the findings. For record-keeping and further consultation, the farmer can download a comprehensive PDF report of the analysis. To accommodate larger herds, the system also supports a batch CSV upload feature, allowing for the efficient processing of data for multiple cows simultaneously.

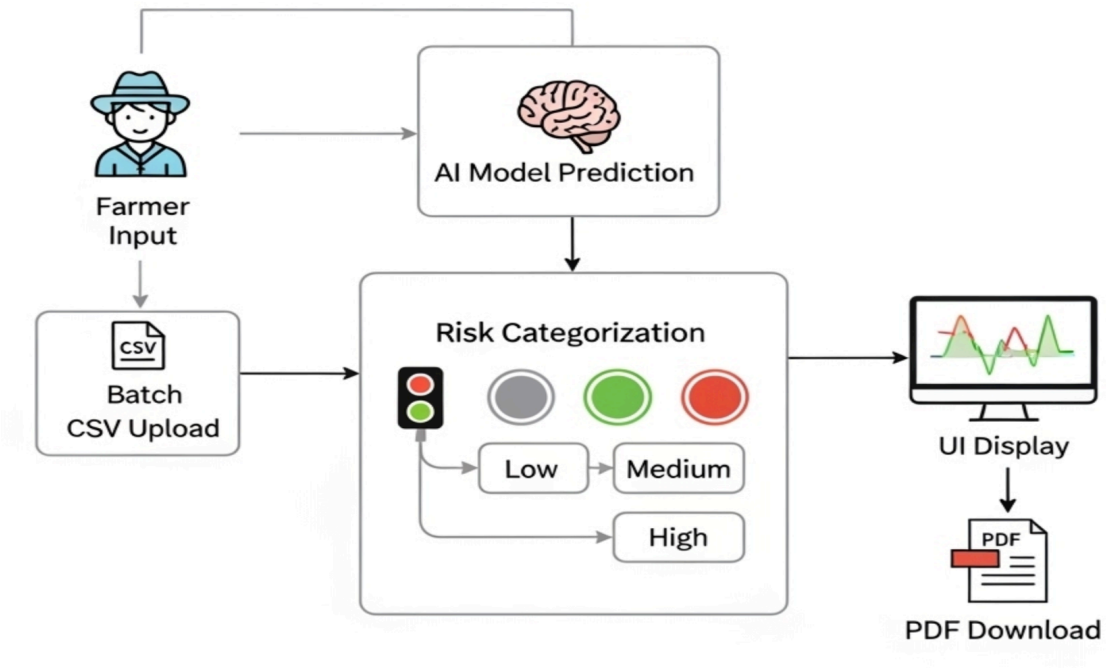
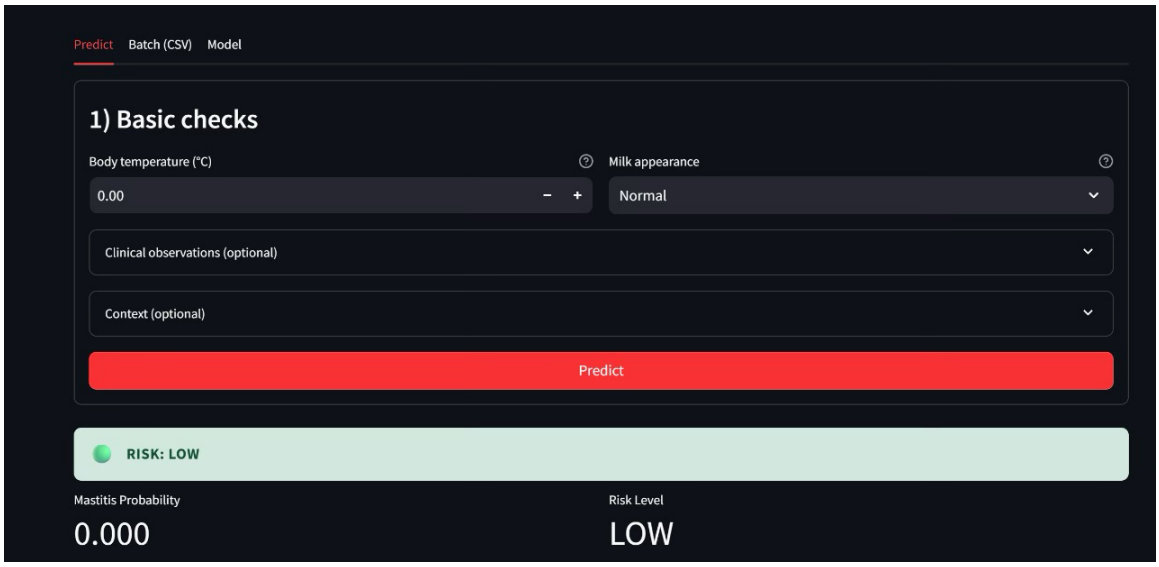
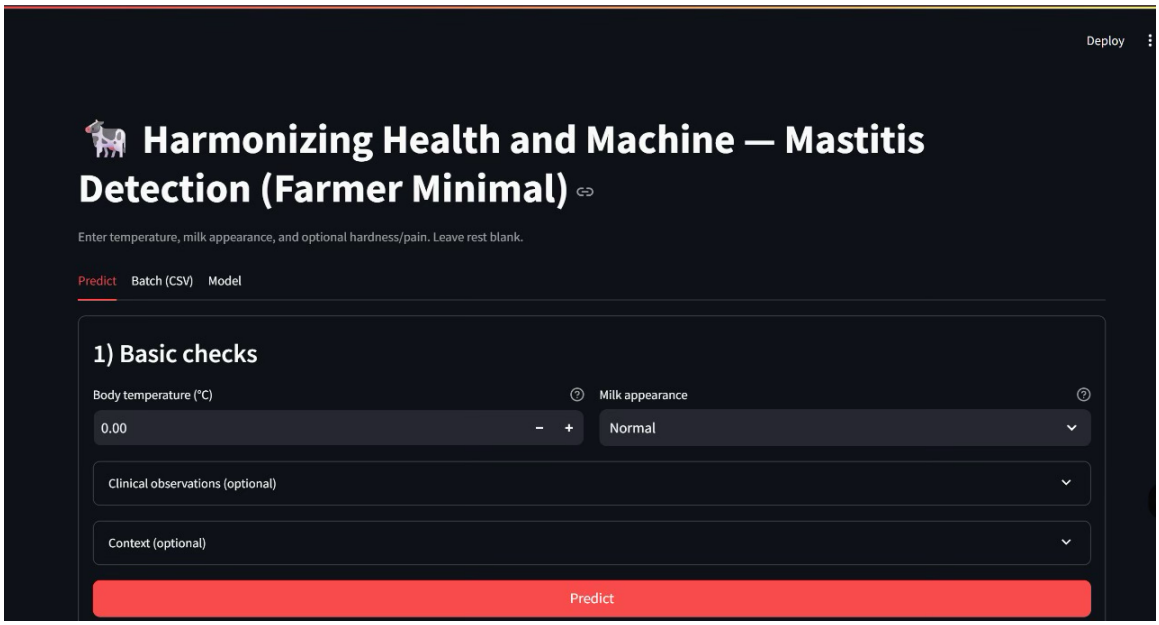
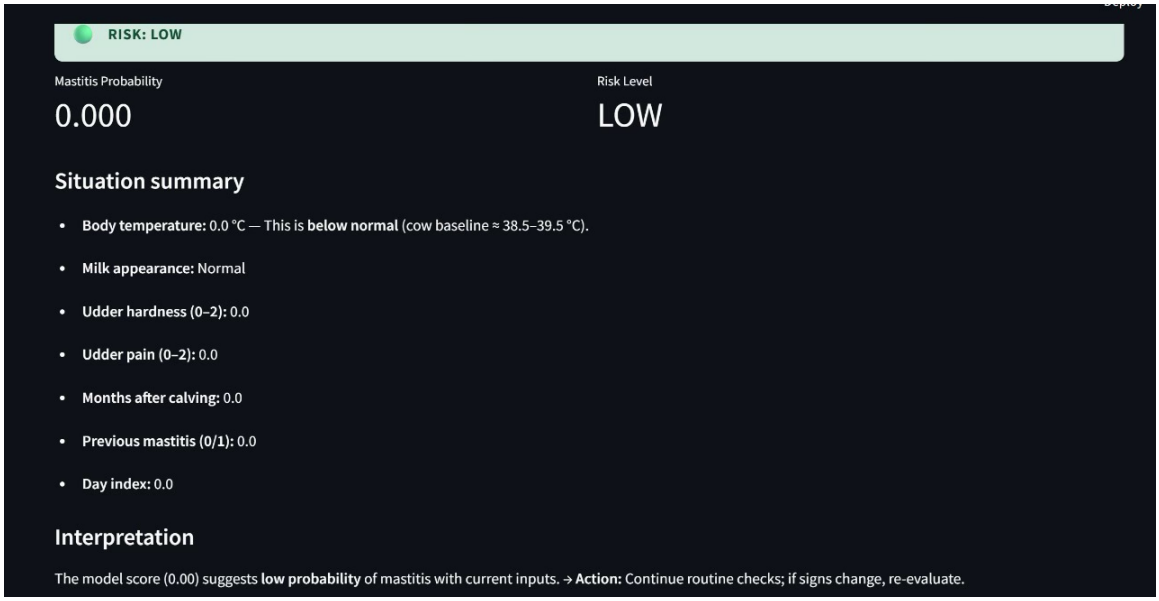


Fig 1. WorkFlow of Mastitis Prediction System

Output :


Predict
Batch (CSV)
Model
1) Basic checks
Body temperature (°C)
Milk appearance
0.00
Normal
Clinical observations (optional)
Context (optional)
Predict
RISK: LOW
Mastitis Probability
0.000
Risk Level
LOW


Deploy
Harmonizing Health and Machine — Mastitis Detection (Farmer Minimal)
Enter temperature, milk appearance, and optional hardness/pain. Leave rest blank.
Predict
Batch (CSV)
Model
1) Basic checks
Body temperature (°C)
Milk appearance
0.00
Normal
Clinical observations (optional)
Context (optional)
Predict


RISK: LOW
Mastitis Probability
0.000
Risk Level
LOW
Situation summary
Body temperature: 0.0 °C — This is below normal (cow baseline ≈ 38.5–39.5 °C).
Milk appearance: Normal
Udder hardness (0–2): 0.0
Udder pain (0–2): 0.0
Months after calving: 0.0
Previous mastitis (0/1): 0.0
Day index: 0.0
Interpretation
The model score (0.00) suggests low probability of mastitis with current inputs. → Action: Continue routine checks; if signs change, re-evaluate.