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% JNT Agri Guardian - Expert System for Crop Suitability

% Author: Presenter A

% File: jnt\_agri\_guardian\_expert\_system\_v1.pl

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% ----------------------

% Dynamic user conditions (asserted during runtime)

% ----------------------

:- dynamic soil\_type/1.

:- dynamic climate/1.

:- dynamic temperature/1.

:- dynamic rainfall/1.

:- dynamic altitude/1.

:- dynamic ph\_level/1.

:- dynamic sunlight/1.

% ============================================================================

% === ENVIRONMENTAL DOMAINS ===

% ============================================================================

% === Soil Types ===

soil(loamy).

soil(sandy).

soil(clayey).

soil(silty).

soil(peaty).

soil(chalky).

% === Climate Types ===

climate(humid).

climate(dry).

climate(temperate).

climate(tropical).

climate(arid).

% === Temperature Ranges (in °C) ===

temperature\_range(low). % < 15°C

temperature\_range(moderate). % 15–25°C

temperature\_range(high). % > 25°C

% === Rainfall Levels (mm/year) ===

rainfall(low). % < 500 mm

rainfall(moderate). % 500–1200 mm

rainfall(high). % > 1200 mm

% === Altitude Levels (meters above sea level) ===

altitude(lowland). % < 500 m

altitude(midland). % 500–1500 m

altitude(highland). % > 1500 m

% === Soil pH Ranges ===

ph\_level(acidic). % pH < 6

ph\_level(neutral). % pH 6–7.5

ph\_level(alkaline). % pH > 7.5

% === Sunlight Exposure ===

sunlight(full\_sun). % 6+ hours/day

sunlight(partial\_sun). % 3–6 hours/day

sunlight(shade). % < 3 hours/day

% ============================================================================

% === CROP SUITABILITY RULES ===

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% -----------------

% Banana

% -----------------

suitable\_crop(banana) :-

soil\_type(loamy),

climate(humid),

temperature(high),

rainfall(high),

altitude(lowland),

ph\_level(neutral),

sunlight(full\_sun).

% -----------------

% Maize (Corn)

% -----------------

suitable\_crop(maize) :-

(soil\_type(loamy); soil\_type(sandy)),

climate(temperate),

temperature(moderate),

rainfall(moderate),

(altitude(lowland); altitude(midland)),

ph\_level(neutral),

sunlight(full\_sun).

% -----------------

% Rice

% -----------------

suitable\_crop(rice) :-

(soil\_type(clayey); soil\_type(silty)),

climate(humid),

temperature(high),

rainfall(high),

altitude(lowland),

ph\_level(acidic),

sunlight(full\_sun).

% -----------------

% Wheat

% -----------------

suitable\_crop(wheat) :-

soil\_type(loamy),

climate(temperate),

temperature(moderate),

rainfall(moderate),

altitude(midland),

ph\_level(neutral),

sunlight(full\_sun).

% -----------------

% Beans

% -----------------

suitable\_crop(beans) :-

(soil\_type(loamy); soil\_type(sandy)),

climate(temperate),

temperature(moderate),

rainfall(moderate),

altitude(midland),

ph\_level(neutral),

sunlight(partial\_sun).

% -----------------

% Sorghum (Drought-Resistant)

% -----------------

suitable\_crop(sorghum) :-

soil\_type(sandy),

climate(arid),

temperature(high),

rainfall(low),

altitude(lowland),

ph\_level(neutral),

sunlight(full\_sun).

% -----------------

% Cassava (Tolerant to many conditions)

% -----------------

suitable\_crop(cassava) :-

(soil\_type(sandy); soil\_type(loamy)),

(climate(tropical); climate(dry)),

(temperature(high); temperature(moderate)),

(rainfall(moderate); rainfall(low)),

(altitude(lowland); altitude(midland)),

(ph\_level(neutral); ph\_level(acidic)),

sunlight(full\_sun).

% ============================================================================

% === USAGE NOTES ===

% ============================================================================

% To use this system:

% 1. Assert environmental facts based on the user's location or input:

% assert(soil\_type(loamy)).

% assert(climate(humid)).

% assert(temperature(high)).

% assert(rainfall(high)).

% assert(altitude(lowland)).

% assert(ph\_level(neutral)).

% assert(sunlight(full\_sun)).

%

% 2. Query for suitable crops:

% ?- suitable\_crop(Crop).

%

% 3. You can also list all supported crops using:

% ?- findall(C, suitable\_crop(C), Crops).

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