% Knowledge Base - Disease and Symptoms

% Define diseases and their associated symptoms with (expanded with more symptoms)

disease(covid19, [fever, cough, sore_throat, fatigue, loss_of_taste, shortness_of_breath, headache, chills, muscle_pain, nasal_congestion, bluish_fingertips, dizziness, nausea, diarrhea, vomiting, confusion, sore_muscles, loss_of_smell, chest_pain, rapid_breathing]).

disease(influenza, [fever, cough, sore_throat, fatigue, headache, chills, runny_nose, sneezing, nasal_congestion, watery_eyes, body_aches, sweating, hoarseness]).

disease(common_cold, [runny_nose, sore_throat, cough, fatigue, sneezing, nasal_congestion, headache, low_fever, watery_eyes, ear_pain, hoarseness]).

disease(malaria, [fever, chills, headache, joint_pain, fatigue, nausea, vomiting, sweating, muscle_pain, abdominal_pain, enlarged_spleen, anemia, dizziness, confusion, pale_skin, jaundice, dark_urine]).

disease(typhoid, [fever, abdominal_pain, headache, weight_loss, nausea, vomiting, weakness, diarrhea, constipation, loss_of_appetite, rose_spots_on_skin, sore_throat, bloating, dizziness, confusion, liver_enlargement]).

disease(dengue, [fever, rash, joint_pain, headache, nausea, vomiting, fatigue, muscle_pain, bleeding_gums, pain_behind_eyes, low_platelet_count, severe_body_aches, bone_pain, weakness, itchy_skin, swollen_lymph_nodes]).

disease(hepatitis, [yellow_skin, dark_urine, abdominal_pain, fatigue, nausea, vomiting, loss_of_appetite, joint_pain, swelling, itching, clay_colored_stools, low-grade_fever, confusion, liver_enlargement]).

disease(pneumonia, [fever, cough, shortness_of_breath, chest_pain, fatigue, chills, headache, sweating, wheezing, blue_lips, rust_colored_sputum, rapid_breathing, confusion, fast_heart_rate]).

disease(gastroenteritis, [abdominal_pain, nausea, vomiting, diarrhea, fever, bloating, loss_of_appetite, dehydration, headache, weakness, stomach_cramps, body_aches, low_energy, watery_stools]).

disease(meningitis, [fever, headache, stiff_neck, nausea, vomiting, sensitivity_to_light, confusion, drowsiness, seizures, chills, purple_skin_rash, altered_consciousness, irritability, hearing_loss]).

disease(arthritis, [joint_pain, swelling, stiffness, fatigue, limited_motion, joint_tenderness, weakness, low_grade_fever, warmth_in_joints, nodules, back_pain]).

disease(asthma, [shortness_of_breath, wheezing, chest_tightness, coughing, fatigue, rapid_breathing, difficulty_talking, anxiety, sweating, nasal_congestion, nighttime_worsening, dry_cough]).

disease(diabetes, [frequent_urination, increased_thirst, fatigue, blurry_vision, slow_healing_wounds, weight_loss, nausea, dry_mouth, numbness, irritability, fruity_breath_odor, tingling_in_hands, weight_gain]).

disease(appendicitis, [abdominal_pain, nausea, vomiting, fever, loss_of_appetite, bloating, diarrhea, constipation, chills, fatigue, pain_in_lower_right_abdomen, abdominal_distention, pain_when_moving, tenderness_in_abdomen]).

disease(chickenpox, [rash, fever, headache, fatigue, itching, blisters, loss_of_appetite, muscle_pain, abdominal_pain, sensitivity_to_light, scabbing_lesions, swollen_lymph_nodes, cough, sore_throat]).

disease(eczema, [rash, itching, redness, dry_skin, cracking_skin, swelling, scaly_skin, burning_sensation, crusting_skin, watery_bumps, flare_ups_due_to_allergens, skin_inflammation, thickened_skin]).

disease(psoriasis, [red_patches, scaly_skin, itching, burning_sensation, swelling, cracked_skin, joint_pain, thick_nails, dry_skin, fatigue, silvery_scales, scalp_scaling, sore_skin, thickened_skin]).

disease(bronchitis, [cough, fatigue, shortness_of_breath, chest_discomfort, wheezing, fever, chills, sore_throat, nasal_congestion, runny_nose, persistent_mucus, tightness_in_chest, low_energy, difficulty_breathing]).

disease(tuberculosis, [cough, fever, night_sweats, weight_loss, chest_pain, fatigue, chills, loss_of_appetite, coughing_blood, shortness_of_breath, swollen_lymph_nodes, weakness, cough_with_sputum]).

disease(ulcer, [abdominal_pain, nausea, bloating, weight_loss, fatigue, vomiting, black_stools, heartburn, loss_of_appetite, pain_relieved_by_eating, indigestion, nausea_after_meals, stomach_bloating]).

% User Symptoms Knowledge Base

:- dynamic user_symptom/1.

% Ask the user if they have a particular symptom

ask_symptom(Symptom) :-

  write('Do you have the symptom: '), write(Symptom), write('? (y for yes/n for no): '),

  read_input(Input),

  (Input == y ->

    assert(user_symptom(Symptom)),

```prolog
    write(Symptom), write(' added.\n')

;   Input == n ->

    write(Symptom), write(' not added.\n')

;   write('Invalid response, please answer with y for yes or n for no.\n'),

    ask_symptom(Symptom)  % Retry if input is invalid

).


% Read input from user, sanitizing it

read_input(Input) :-

    read_line_to_string(user_input, Str),

    normalize_space(string(CleanStr), Str),

    atom_string(Input, CleanStr). % Convert string to atom


% Collect user symptoms

get_user_symptoms(Symptoms) :-

    write('Collecting symptoms...\n'),

    ask_symptom(fever),

    ask_symptom(cough),

    ask_symptom(sore_throat),

    ask_symptom(fatigue),

    ask_symptom(loss_of_taste),

    ask_symptom(runny_nose),

    ask_symptom(chills),

    ask_symptom(sweating),

    ask_symptom(shortness_of_breath),
```

sore_skin

scalp_scaling

cracked_skin

black_stools

tightness_in_chest

chest_discomfort

thickened_skin

skin_inflammation

crusting_skin

watery_bumps

tenderness_in_abdomen

abdominal_distention

tingling_in_hands

numbness

dry_mouth

indigestion

increased_thirst

dry_cough

anxiety

frequent_urination

difficulty_talking

blurry_vision

coughing

nausea_after_meals

chest_tightness

slow_healing_wounds

stomach_bloating

back_pain

pain_when_moving

warmth_in_joints

seizures

rapid_breathing

weight_gain

confusion

sore_muscles

muscle_pain

blisters

nasal_congestion

dizziness

loss_of_smell

redness

ask_symptom(chest_pain),

ask_symptom(yellow_skin),

ask_symptom(dark_urine),

ask_symptom(headache),

ask_symptom(nausea),

ask_symptom(abdominal_pain),

ask_symptom(weight_loss),

ask_symptom(joint_pain),

ask_symptom(stiff_neck),

ask_symptom(rash),

ask_symptom(itchy_skin),

ask_symptom(vomiting),

ask_symptom(diarrhea),

ask_symptom(loss_of_appetite),

ask_symptom(bleeding_gums),

ask_symptom(heartburn),

ask_symptom(ear_pain),

ask_symptom(bluish_fingertips),

ask_symptom(enlarged_spleen),

ask_symptom(rose_spots_on_skin),

ask_symptom(pain_behind_eyes),

ask_symptom(clay_colored_stools),

ask_symptom(rust_colored_sputum),

ask_symptom(stomach_cramps),

ask_symptom(purple_skin_rash),

sneezing

cracking_skin

watery_eyes

low_fever

body_aches

dry_skin

hoarseness

drowsiness

anemia

pale_skin

irritability

jaundice

weakness

joint_tenderness

constipation

hearing_loss

bloating

liver_enlargement

scaly_skin

low_platelet_count

burning_sensation

severe_body_aches

limited_motion

bone_pain

swelling

itching

cough_with_sputum

difficulty_breathing

wheezing

altered_consciousness

blue_lips

thick_nails

fast_heart_rate

stiffness

dehydration

low_energy

night_sweats

watery_stools

red_patches

sensitivity_to_light

```prolog
    ask_symptom(nodules),

    ask_symptom(nighttime_worsening),

    ask_symptom(fruity_breath_odor),

    ask_symptom(pain_in_lower_right_abdomen),

    ask_symptom(scabbing_lesions),

    ask_symptom(flare_ups_due_to_allergens),

    ask_symptom(silvery_scales),

    ask_symptom(persistent_mucus),

    ask_symptom(coughing_blood),

    ask_symptom(swollen_lymph_nodes),

    ask_symptom(pain_relieved_by_eating),

    findall(Symptom, user_symptom(Symptom), Symptoms),

    write('Symptoms collected: '), write(Symptoms), nl.


% Diagnose the diseases based on the symptoms with likelihood percentages

diagnose_with_percent(UserSymptoms, SortedDiagnosisWithPercent) :-

    findall(Disease-Percent,

        (   disease(Disease, Symptoms),

            intersection(Symptoms, UserSymptoms, MatchedSymptoms),

            length(MatchedSymptoms, MatchedCount),

            length(Symptoms, TotalCount),

            Percent is (MatchedCount / TotalCount) * 100

        ),

        DiagnosisWithPercent),

    sort(2, @>=, DiagnosisWithPercent, SortedDiagnosisWithPercent). % Sort by percentage in descending
order
```

```prolog
% Display the top 10 results with percentages

display_top_diseases([]) :-

    write('No diseases matched with the symptoms.\n').

display_top_diseases(DiagnosisWithPercent) :-

    write('Top 10 possible diagnoses with likelihood percentages:\n'),

    length(DiagnosisWithPercent, Length),

    (   Length > 10 ->

        length(Top10, 10),

        append(Top10, _, DiagnosisWithPercent)

    ;   Top10 = DiagnosisWithPercent

    ),

    foreach(member(Disease-Percent, Top10),

        (   format('Disease: ~w - Likelihood: ~1f%~n', [Disease, Percent]))).


% Start the diagnosis process

start_diagnosis :-

    write('Welcome to the Disease Diagnosis System!\n'),

    get_user_symptoms(Symptoms),

    diagnose_with_percent(Symptoms, SortedDiagnosisWithPercent),

    display_top_diseases(SortedDiagnosisWithPercent).


% To clear user symptoms for a fresh diagnosis session

clear_user_symptoms :-

    retractall(user_symptom(_)).
```