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function [truepositive,falsepositive] = evaluationfunction(stride,D,D_detected,Ts,N)
%
% detectionrates()
%
% DESCRIPTION:
% This function computes the TP, FP, TN, FN based on a true vector with
% detected meals D, and a computed vector with detected meals D_detected.
% It uses a stride since the meal will be detected a time period after the
% meals was given.
% It uses the indices for the true meals and the detected meals to compare
% if in the stride a meals should be detected or not and vise versa.
%
% INPUT:
% stride          - The maximal time period it takes from the meal to be
% detected
% D               - The true vector of real meals.
% D_detected      - The estimated vecor of 0 or 1. 1 meaning meals is
% detected
% U               - Bolus insulin
%
% Ts              - The time between control steps
% N               - The number of observations
%
% OUTPUT:
% Two outputs being TP, FP
%
% PROJECT:
% Fagprojekt 2022
% A diabetes case study - Meal detection
%
% GENEREL:
% BSc              : Mathematics and technology
% University       : The Technical University of Denmark (DTU)
% Department       : Applied Mathematics and Computer Science
%
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%
% Initializing
falsenegative = 0;
falsepositive = 0;
truepositive  = 0;
truemeals     = zeros(1,N);
mealdetec     = zeros(1,N);

% Changing datatype of D to binary
for i = 1:N

    if D(1,i) >= 50/Ts % Not considering the snackmeals
        D(1,i) = 1;
    end
end

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    else
        D(1,i) = 0;
    end

end

% Finding the indices for the true meals
for i = 1 : N
    if D(1,i) == 1
        truemeals(i) = i;
    end
end

% Finding the indices for the detected meals
for i = 1 : N
    if D_detected(i) == 1
        mealdetec(i) = i;
    end
end

% Removing all the zeros so there is only the indices left
idxdetecmeals = nonzeros(mealdetec)';
idxtruemeals = nonzeros(truemeals)';

% Examine if there are no true meals where there are detected meals
for i = 1:length(idxdetecmeals)

    % The idx value when meal has been detected
    k = idxdetecmeals(i);

    if (k-stride) < 1
        j = k-1;

        if sum(D(1,k-j:k)) == 0
            falsepositive = falsepositive + 1;
        end

    elseif sum(D(1,k-stride:k)) == 0
        falsepositive = falsepositive + 1;
    end
end

% Examine if there are true meals where there are detected meals
for i = 1:length(idxdetecmeals)

    % The idx value when meal has been detected
    k = idxdetecmeals(i);

    if (k-stride) < 1
        j = k-1;

        if sum(D(1,k-j:k)) == 0
            falsepositive = falsepositive + 1;
        end

    elseif sum(D(1,k-stride:k)) == 1
        truepositive = truepositive + 1;
    end
end
```

end
end

end