Function to generate time attenuation curves

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% Inputs:
    % frame_rate       : frame rate of the scanner
    % acquisition_time : total time of the scan
    % max_atts         : max attenuation for each TAC in HU
    % delays           : time delay before peak begins
    % tmaxs            : time where max value occurs
    % alpha_params     : alpha param to specify shape
    % ROI              : struct with ROI data
    % filename         : filename to store data to into inData folder

% Outputs:
    % TAC              : struct containing TAC curves for each ROI

function TAC=tac_generator(frame_rate,acquisition_time,max_atts,delays,tmaxs,alpha_params,ROI,filename)

    % directory to load files from and save files to
    vnDir = 'inData';

    % create time vector
    t = 0:0.001:acquisition_time;

    % calculate number of iterations
    nframes = frame_rate*acquisition_time;

    %loop through each TAC
    for i = 1:length(max_atts)

        % place inputs into struct
        TAC(i).max_att = max_atts(i);
        TAC(i).delay = delays(i);
        TAC(i).tmax = tmaxs(i);
        TAC(i).alpha_param = alpha_params(i);

        % calculate difference between max attenuation and background
        TAC(i).delta = TAC(i).max_att - ROI(i).bg_HU;

        % call function to generate TAC data in HU
        TAC(i).f_HU = alter_gvf(t,TAC(i).delay,TAC(i).alpha_param,TAC(i).delta,TAC(i).tmax)+ROI(i).bg_HU;

        % convert to attenuation
        TAC(i).f_att = ((TAC(i).f_HU-1000-ROI(i).bg_HU)/1000+1)*0.02;

        % discretize time values and TAC
        TAC(i).timevalues = single(round(linspace(1,length(TAC(i).f_att),nframes)));
        TAC(i).discrete_f =  TAC(i).f_att(TAC(i).timevalues);

        % create vector of scale factors to multiply ROI for each time step
        TAC(i).scale_factor = (ROI(i).bg_att+TAC(i).discrete_f)/ROI(i).bg_att;

        clear vn;
    end

    % save files to inData folder
    save([vnDir, '/TAC_', filename, '.mat'], 'TAC', '-v7.3');

end
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