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%% Project 1: Time-Delay Estimation in GNSS %%
% you do not need the code file %

%% Load measurements: received signal
load('proj_1_sample.mat');

%% Correlation
% sampling rate
f=1.023e6;

% Calculation
% Here goes your code

%parallel search in time
tic

delta_tau=1/f;
tau = 0:delta_tau:size(REC_SIGNAL)*delta_tau-delta_tau;
Corr = zeros(1, length(tau));
a=1;

Y_fft = (fft(REC_SIGNAL));
[time, c] =gnss_signal(0);
C_fft= conj(fft(c));
Corr = (ifft(Y_fft.*C_fft)).^2;

toc %takes 0.051 seconds

% sequenciel search -> takes longer

% tic
% for i=tau
%     [time, c] =gnss_signal(i);
%     Corr(1,a) = abs (REC_SIGNAL'*c);
%     a=a+1;
%
% end
% toc %takes about 8 seconds

[maxCorr,maxA] = max(real(Corr));

tau_shift = tau(maxA);
tau_shift_fs = tau_shift/delta_tau;

%% Please print your result
figure,
plot(tau,Corr); title('Correlation yN to c(tau)'); xlabel('tau [s]'); ylabel('Correlation');

X=sprintf('The signal is shifted by %fs (%i chips) to the PRN code\n',tau_shift,
tau_shift_fs);
disp(X);
```