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% DO_MNT_CAR_EXPS - Performs the experiments presented in the book on the mountain valley
problem
% which is linear, gradient-decent SARSA( $\lambda$ ) with binary features and an  $\epsilon$ -
greedy policy
%
% Written by:
% --
% John L. Weatherwax          2008-02-19
%
% email: wax@alum.mit.edu
%
% Please send comments and especially bug reports to the
% above email address.
%
%-----

clc; close all;
more off;

% the probabiity of an exploratory move:
epsilon = 0.0;

% discount factor:
gamma = 1.0;
%gamma = 0.9;

% the number of episodes to perform:
%nEpisodes = 3;
nEpisodes = 20;
%nEpisodes = 2000;

% the type of elagability trace (replacing=0 or accumulating=1):
ACC_ET = 1;

% the number of monte carlo trials to perform ... for good statistics:
%n_MC = 2;
N_MC = 30;

nAlphaV = 5;

GetTiles_Mex_Script; % <- used to just to make sure that the C code has been "mexed"

%--
% ACCUMULATING/REPLACING TRACES:
%--

lambdaV = [ 0.4, 0.7, 0.8, 0.9, 0.95, 0.99, 1.0 ];
alphaV = linspace( 0, 1.2, nAlphaV );

allResults = zeros(length(lambdaV),length(alphaV)); imc_results = zeros(1,N_MC);
plt_lbls=cell(1,length(lambdaV));
for li=1:length(lambdaV),
    lambda = lambdaV(li);
    fprintf('working on lambda=%10.5f...\n',lambda);
    for ai=1:length(alphaV),
        alpha = alphaV(ai);
        fprintf(' working on alpha=%10.5f...\n',alpha);
        for mci=1:N_MC,
            if( mod(mci,10)==0 ) fprintf('    working on monte carlo=%10d...\n',mci); end

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[theta,atspe] = mnt_car_learn(nEpisodes, epsilon,gamma,alpha,lambda,ACC_ET, 0);
imc_results(mci) = atspe;
end
allResults(li,ai) = mean(imc_results);
end
plt_lbls{li} = sprintf('lambda = %.2f',lambda);
end

figure; ph=plot( alphaV, allResults.', '-' ); axis tight;
legend(ph,plt_lbls);
xlabel('alpha'); ylabel('steps per episode');
if( ACC_ET==0 )
    title('replacing traces various lambdas');
    saveas( gcf, sprintf('mc_learning_curves_replacing_et_mxts_ne_%d_nmc_%d', nEpisodes,
N_MC), 'png' );
else
    title('accumulating traces various lambdas');
    saveas( gcf, sprintf('mc_learning_curves_accumulating_et_mxts_ne_%d_nmc_%d', nEpisodes,
N_MC), 'png' );
end
```