

7. Source Code for the LeaderRank algorithm

We attached here the source code for running LeaderRank algorithm:

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% This is a Matlab M-file for LeaderRank.
E=load('Network.dat'); % Read the network data with different pairs
                        % of 'fan leader' in consecutive rows, and the
                        % labels of nodes should start from 1
l=length(E);           % l is the number of links
N=max(max(E));         % N is the number of nodes.

% Add ground node and create adjacency matrix P
EG1=zeros(N,2);
EG2=zeros(N,2);
for i=1:N
    EG1(i,1)=N+1;
    EG1(i,2)=i;
end
EG2(:,1)=EG1(:,2);
EG2(:,2)=EG1(:,1);
E=[E;EG1;EG2];
P=sparse(E(:,1),E(:,2),1);
D_in=sum(P);          % in degree
D_out=sum(P');        % out degree

% Transition matrix PP
EE=zeros(N+1,2);
for j=1:N+1
    EE(j,1)=j;
    EE(j,2)=1/D_out(j);
end
D=sparse(EE(:,1),EE(:,1),EE(:,2));
PP=D*P;

% Diffusion to stable state.
God=zeros(N+1,1);
God(1:N,1)=1;        % Assign initial resource
error=10000;         % error is the average error of nodes' scores.
error_threshold=0.00002; % It is a tunable parameter controlling the
                        % error tolerance.

step=1;
while error>error_threshold
    step
    M=God;
    God=PP'*God;
    error=sum(abs(God-M)./M)/(N+1);
    step=step+1;
end
b=God(N+1)/N;
God=God+b;
God(N+1)=0;

% Write the ranking results to "Results.dat": node's ID & Score
R=zeros(N,2);
R(:,1)=[1:N]';

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R(:,2)=God(1:N);  
[ b, pos ] = sort( -R( :, 2 ) );  
R = R(pos, : );  
fid = fopen( 'Results.dat', 'w' );  
for i=1:N  
    fprintf(fid, '%d %f \n', R(i,1), R(i,2));  
end  
fclose(fid);
```