```
function [X,err]= SOR_variant(A,b,w)

sz=size(A,1);
x= zeros(sz,3);

iter=1;
while true

   for i=1:sz
       temp1=0;
       for j=1:i-1
           temp1= temp1 + x(j,2).*A(i,j); % contains GS values already
 calculated
       end
       temp2=0;
       for j=i+1:sz
           temp2= temp2 + x(j,1).*A(i,j); % contains prev iter values
       end
      x(i,2)= (b(i) - temp1 -temp2)./A(i,i);
      x(i,3)= x(i,1) + w.*(x(i,2) - x(i,1));
   end
   max_err=0;
   for k=1:sz
       temp_err= abs((x(k,3)-x(k,2))./x(k,3));
       if(temp_err > max_err)
           max_err= temp_err;
       end
   end
   err(iter)=max_err;
   if(max_err < 1e-6)
       X=x(:,3);
       break;
   end
   x(:,1)=x(:,3);
   iter= iter+1;
end
end
```

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