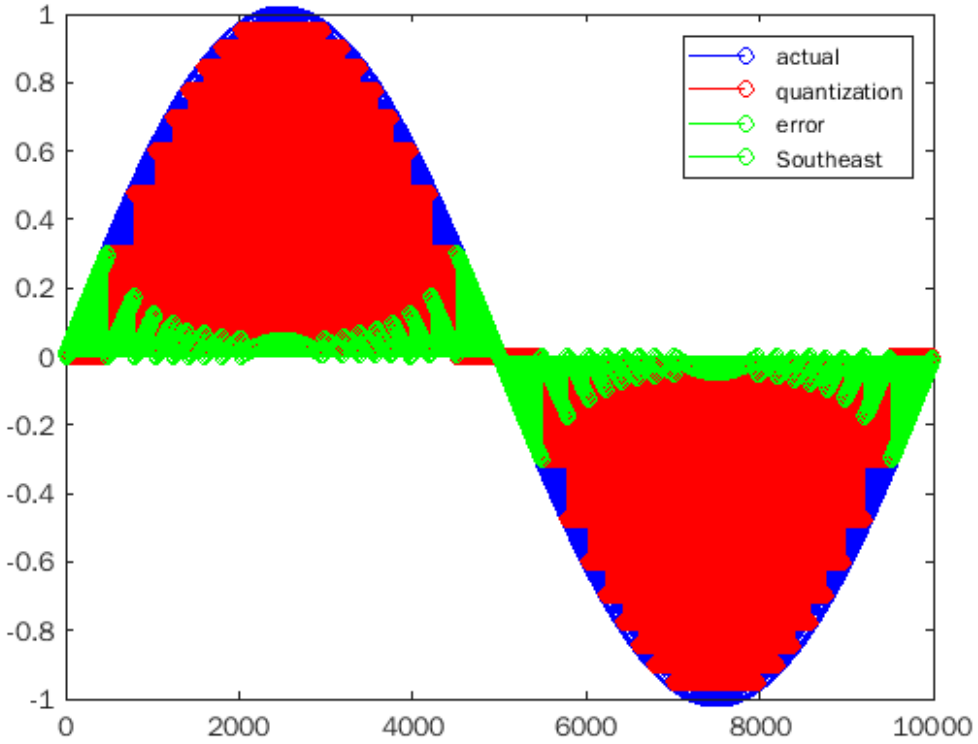
```
% exp 4
% arjun rajesh kulkarni
% 2020uco1505
levels = 10;
N = 10000;
n = 0:(N-1);
x = sin(2*pi*n/N);
x(x>=1) = (1);
x(x<-1) = -1;
xl = [];
for i = 1 : levels
   xl = [xl log2(i)];
end
xl = [-eps -1*xl(2:levels) xl(2:levels)];
xl = sort(xl);
mn = min(xl);
mx = max(xl);
xls =  2*(xl) ./ (mx-mn);
xe = [];
xq = [];
for i = 1 : length(x)
   p = 0;
   for j = 1 : length(xls)-1
    if( x(i)>= 0 && x(i) >= xls(j) && x(i)<=xls(j+1))
        xq = [xq xls(j)];
        xe = [xe x(i)-xls(j)];
        p = p+1;
        break;
    elseif( x(i)< 0 && x(i) >= xls(j) && x(i)<=xls(j+1))
        xq = [xq xls(j+1)];
        xe = [xe x(i)-xls(j+1)];
p = p+1;
        break;
    end
   end
end
stem(x,'b');
hold on;
stem(xq,'r');
hold on;
stem(xe,'g');
legend('actual','quantized','error');
hold on;
stem(xe, 'g');
legend('actual', 'quantization', 'error', 'Southeast');
```



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