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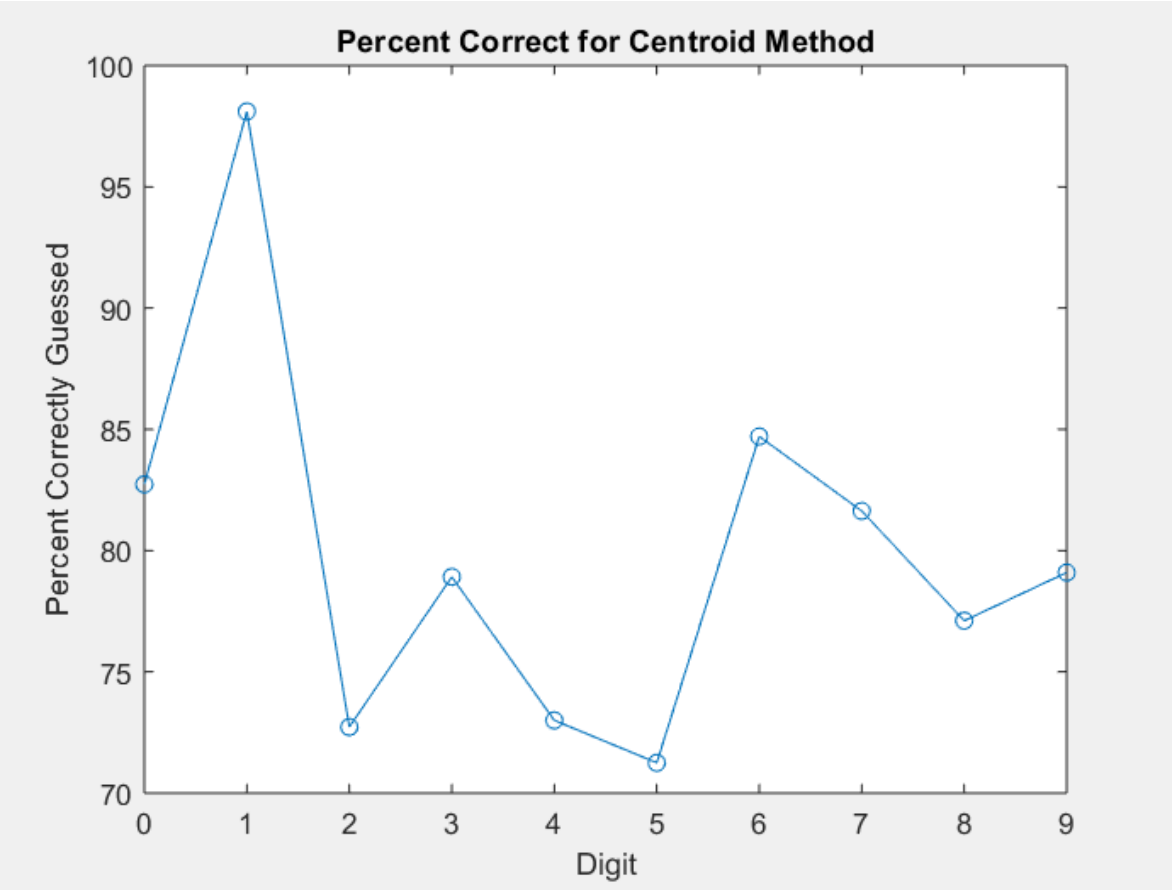
Centroid Method for Digit Recognition



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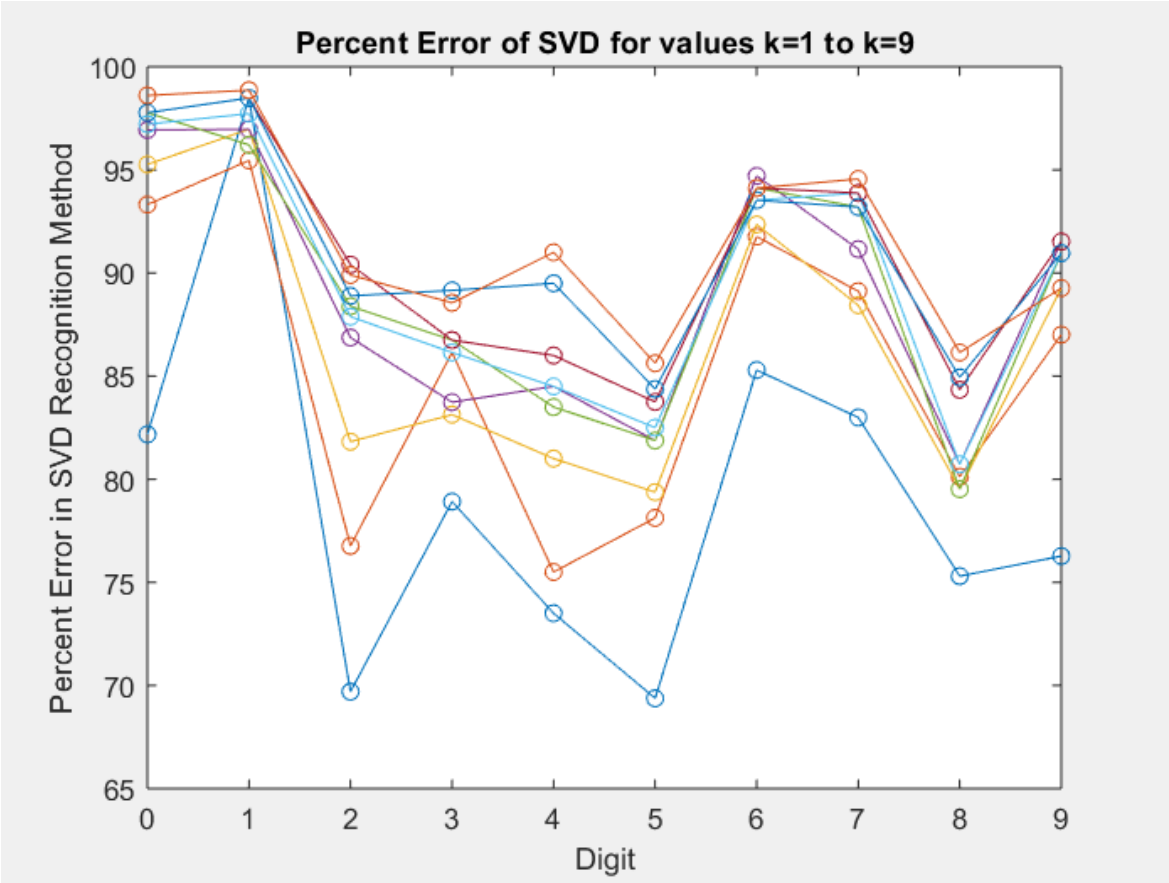
SVD Method for Digit Recognition



Code for Centroid Method

```
countlabel = tabulate(dzip);

% Find all columns in dzip that are the same digit

for u = 1:10
    a=find(dzip==u-1);
    I{u}=a;
end

% Take average of these in azip to get model digit

for j = 1:10
    azipmodel = zeros(256,1);
    for i = 1:length(I{j})
        azipmodel = azipmodel + azip(:,I{j}(1,i));
    end
    modeldigit{j} = azipmodel/length(I{j});
   % figure(j);
   % ima2(modeldigit{j});
end

% Compute distance between unknown and model digits
% Create vector k of recognized digits in test set
k = [];
d=[];
for n = 1:length(testzip)
    for j = 1:10
        d(j) = norm((testzip(:,n)-modeldigit{j}));
    end
    digit = find(d==min(d));
    digit = digit-1;
    k = [k digit];
end
```

```
% Percentage of correctly recognized digits

for u = 1:10
    c=find(k==u-1);
    J{u}=c;
end
for u = 1:10
    d=find(dtest==u-1);
    K{u}=d;
end
numcorrect=[];

for u = 1:10
    numcorrect(u)=length(intersect(J{u},K{u}));
    correctperc(u) = (numcorrect(u)/length(K{u}))*100;
end
x=[1:10];
    plot(x-1, correctperc(x), '-o'); hold on;
```

Code for SVD Method

```
for u = 1:10
    a=find(dzip==u-1);
    I{u}=a;
end

A=[];
for j = 1:10
    for i = 1:length(I{j})
        A{j}(:,i) = [azip(:,I{j}(1,i))];
    end
end
```

```
d=[];
guessedk=zeros(1,2007);

for k = 1:9
     guessed=[];
     for n = 1:length(testzip)
          for j = 1:10
               [U,S,V] = svd(A{j});
               d(j) = norm((eye(256)-U(:,1:k)*U(:,1:k)')*(testzip(:,n)));
          end
          digit = find(d==min(d));
          digit = digit-1;
          guessed = [guessed digit];
     end
     guessedk = [guessedk ; guessed];
end
```

```
% Percent of correctly guessed

numcorrect=[];
for k = 2:10
    C={'k','b','r','g','y','k','b','r','g','y'}
    for u = 1:10
        c=find(guessedk(k,:)==u-1);
        J{u}=c;
        e=find(dtest==u-1);
        K{u}=e;
        numcorrect(u)=length(intersect(J{u},K{u}));
        correctperc(u) = (numcorrect(u)/length(K{u}))*100;
    end
    x=[1:10];
    plot(x-1, correctperc(x), '-o'); hold on;
end
```