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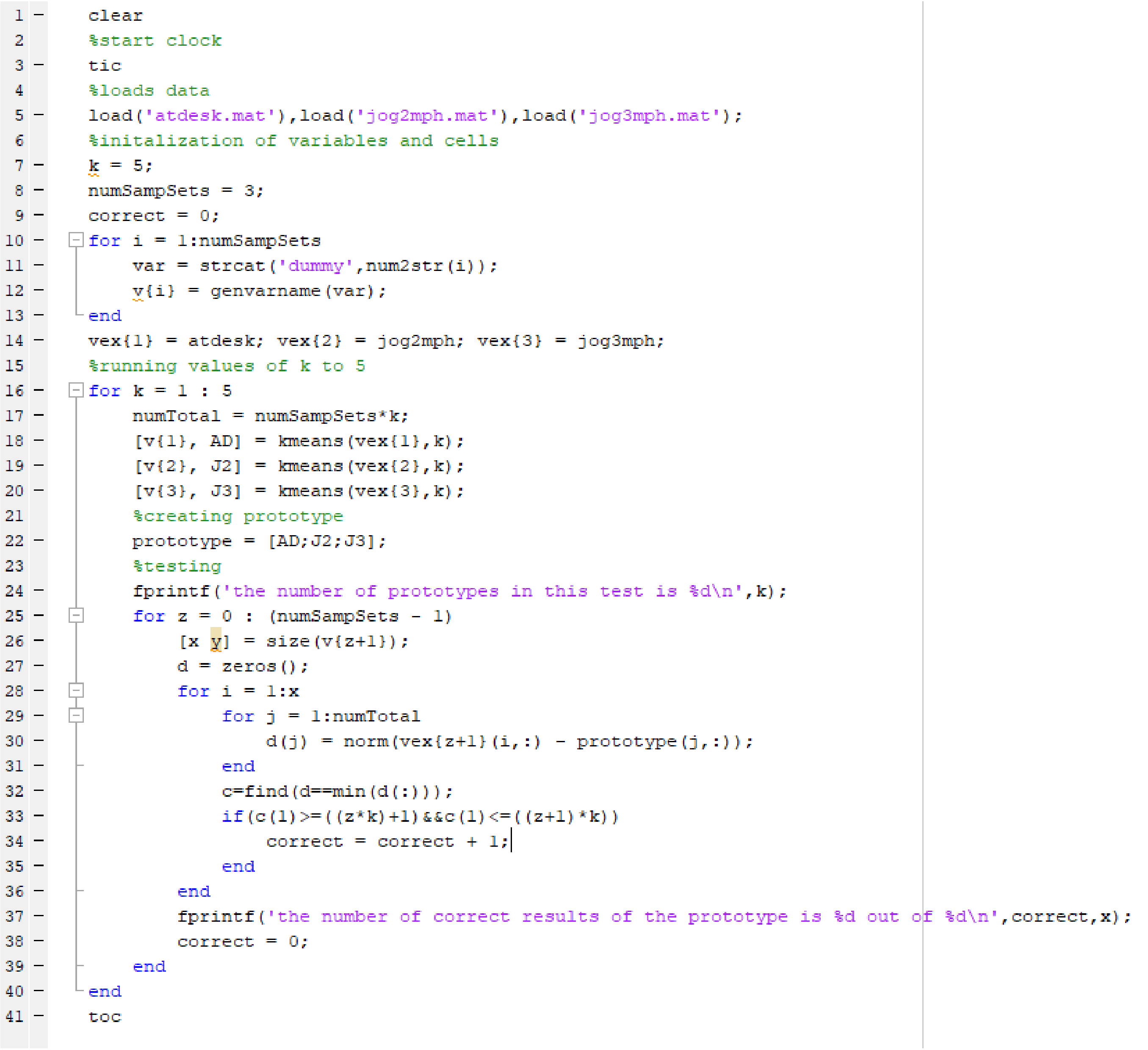
Homework 5

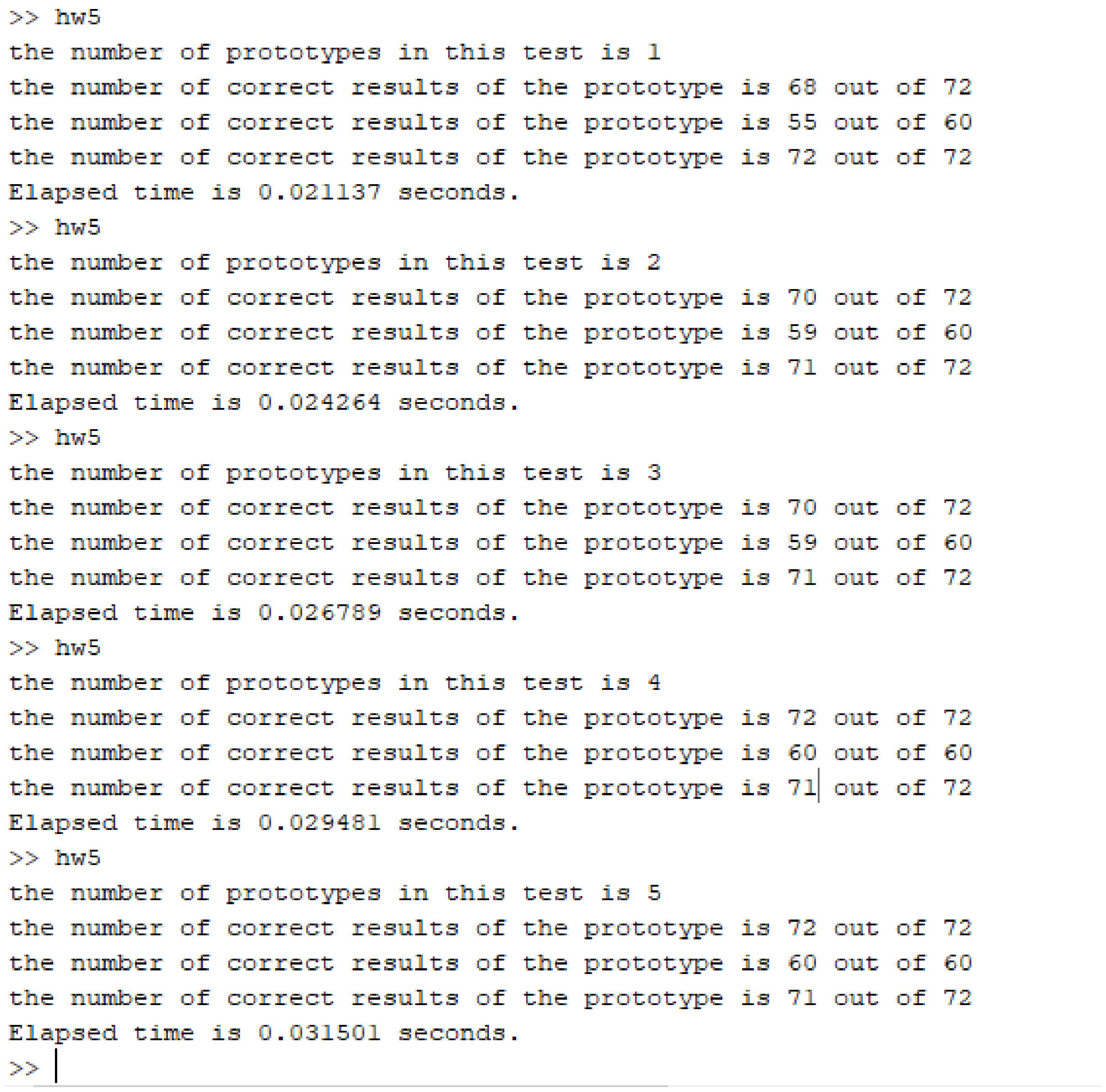
Code



```matlab
clear
%start clock
tic
%loads data
load('atdesk.mat'),load('jog2mph.mat'),load('jog3mph.mat');
%initalization of variables and cells
k = 5;
numSampSets = 3;
correct = 0;
for i = 1:numSampSets
    var = strcat('dummy',num2str(i));
    v{i} = genvarname(var);
end
vex{1} = atdesk; vex{2} = jog2mph; vex{3} = jog3mph;
%running values of k to 5
for k = 1 : 5
    numTotal = numSampSets*k;
    [v{1}, AD] = kmeans(vex{1},k);
    [v{2}, J2] = kmeans(vex{2},k);
    [v{3}, J3] = kmeans(vex{3},k);
    %creating prototype
    prototype = [AD;J2;J3];
    %testing
    fprintf('the number of prototypes in this test is %d\n',k);
    for z = 0 : (numSampSets - 1)
        [x y] = size(v{z+1});
        d = zeros();
        for i = 1:x
            for j = 1:numTotal
                d(j) = norm(vex{z+1}(i,:) - prototype(j,:));
            end
            c=find(d==min(d(:)));
            if(c(1)>=((z*k)+1)&&c(1)<=((z+1)*k))
                correct = correct + 1;
            end
        end
        fprintf('the number of correct results of the prototype is %d out of %d\n',correct,x);
        correct = 0;
    end
end
toc
```

Figure 1 Main code

The code above will run and automatically test all the values from k = 1 to k = 5. This will print out the results below.



```
>> hw5
the number of prototypes in this test is 1
the number of correct results of the prototype is 68 out of 72
the number of correct results of the prototype is 55 out of 60
the number of correct results of the prototype is 72 out of 72
Elapsed time is 0.021137 seconds.
>> hw5
the number of prototypes in this test is 2
the number of correct results of the prototype is 70 out of 72
the number of correct results of the prototype is 59 out of 60
the number of correct results of the prototype is 71 out of 72
Elapsed time is 0.024264 seconds.
>> hw5
the number of prototypes in this test is 3
the number of correct results of the prototype is 70 out of 72
the number of correct results of the prototype is 59 out of 60
the number of correct results of the prototype is 71 out of 72
Elapsed time is 0.026789 seconds.
>> hw5
the number of prototypes in this test is 4
the number of correct results of the prototype is 72 out of 72
the number of correct results of the prototype is 60 out of 60
the number of correct results of the prototype is 71 out of 72
Elapsed time is 0.029481 seconds.
>> hw5
the number of prototypes in this test is 5
the number of correct results of the prototype is 72 out of 72
the number of correct results of the prototype is 60 out of 60
the number of correct results of the prototype is 71 out of 72
Elapsed time is 0.031501 seconds.
>>
```

Figure 2 example results

Looking at the results above this looks to show that prototyping with more and more doesn’t really mean you get exponentially greater results. If you look to 3, 4, and 5. That shows that one doesn’t need to really have 4 or 5 prototypes for this case. And if you look at 1 you can see that it is kind of lacking and 2 comes in at one more and makes it near perfect. So one doesn’t really need a whole lot of prototypes to be effective. W/ these result you can go with 2 or 3 without a worry or a 4 if you need to be stricter.