9.913 Pattern Recognition for Machine Vision
Quick Matlab Tutorial

Matlab

Scalar

```
>> a = 10
a =
    10
>> a = 11;
>> a
a =
    11
```

Matlab

Matrix

```
>> a = [11 12 13]                  - Row matrix
a =
    11    12    13
>> a = [11 12 13; 21 22 23]        - Starting another row
>> a
a =
    11    12    13
    21    22    23
>> a(2, 3)                         - Matrix addressing
ans =                                (1-based)
    23
>> a(3)                            - With a single index
ans =
    12
```

Matlab

Matrix indexing

```
>> 1:3                              - Colon operator
ans =
    1     2     3
>> 10:-2:1                          - With a step
ans =
    10     8     6     4     2
>> a(1, 2:3)                        - Range addressing
ans =
    12    13
>> a(1, 2:3) = 0                    - Setting values
a =
    11     0     0
    21    22    23
>> a(:, 2:3) = []                   - removing columns
a =
    11
    21
```

Matlab

Special matrices

```
>> zeros(2, 3)
ans =
    0     0     0
    0     0     0
>> ones(2, 3)
ans =
    1     1     1
    1     1     1
>> eye(2, 3)
ans =
    1     0     0
    0     1     0
>> rand(2, 3)       - uniformly distribiuted [0,1]
>> randn(2, 3)      - normally distributed μ=0, σ=1
```

Matlab

Matrix operations

```
>> a + b        - addition
>> a * b        - matrix multiplication
>> a .* b       - element-wise multiplication
>> inv(a)       - matrix inverse
>> a ^ 2        - matrix power
>> a .^ b       - element-wise power
>> a / 2        - division by a scalar
>> a ./ b       - element-wise division
>> eig(a)       - matrix eigenvalues
```

Matlab

Scripting

```
<script_name>.m – script file
```

Programming:

```
if  a == 1
    <stuff here>
end

for  ii = 2:100
    a(ii) = a(ii)+a(ii-1);
end

while a == 10
    <stuff here>
end
```

Functions

File fun.m:

```
-------------------------------------
function [a, b] = fun(c, d)
% Everything from here to the empty line will be
% printed if you type “help fun”

a = c + d;
b = a – c;

-------------------------------------
```

Matlab

Plotting:

```
plot(x, y, colspec)
Eg:
>> plot(sin(x))   - default plot against array index
>> plot(x, sin(x), ‘r’)  – red against values of x
>> plot(x, sin(x), ‘g.’) – green dots
>> image(I)              - plots matrix (0-1) as image
>> imagesc(I)            - plots matrix with scaling
                           to 0-1
>> [a, map] = imread(‘file.jpg’); - read .jpg image
                                    from disk
>> imshow(a, map)                - display the image
```

Matlab

Useful commands:

```
help <command>          - help about a command
lookfor <string>        - find all help containing
                          <string>
diary                   - log all subsequent commands
                          to file
```