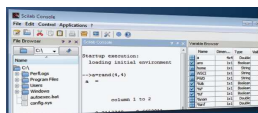# CISC 3250
Systems Neuroscience

Scilab: Loops and vector analysis

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JMH 328A

Matrix math

```
A= [1 2; 3 4];
b= [4; 5];
```

What is `A*b`?

Transpose: `[4; 5]  ==  [4 5]'`
      `a'` flips rows and columns

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Removing excess dimensions

`squeeze` removes extra 1-entry dimensions

- ~~plot(neuroData2(10,26,4,1:$))~~
- `plot(squeeze(neuroData2(10,26,4,1:$)))`

3

Loops: performing repeated actions

```
for index=first:last
  action1;
  action2;
end;
```
Count from `first` to `last`, perform actions each time

```
for i=1:10
a(i)=3*i;
end;
a
[3   6   9  12  15  18  21  24  27  30]
```
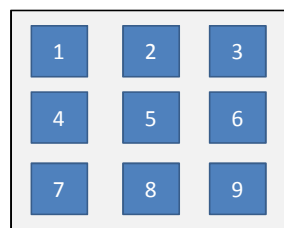
4

Loops: performing repeated actions

```
for i=1:10
figure;
disp2dB(squeeze(neuroData2(1:$,1:$,i,5)))
end;
```

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Multiple plots in one figure

```
subplot(numRows,numCols,index),
plot_command
```
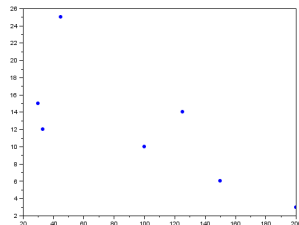
```
subplot(3,3,4), plot(...)
```

1	2	3
4	5	6
7	8	9

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Scatter-plots

Visualizing how two variables vary together

Reaction time	Cortical response
100	10
45	25
150	6
30	15
125	14
33	12
200	3


```
plot(var1,var2,'.')
```
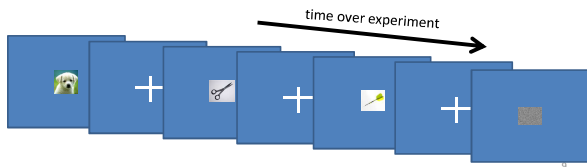
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Comparing vectors

Can compare 2 vectors
- by multiplying `a*b'`
  - high product = high similarity
- by correlating `corr3250(a,b)`
  - between -1 and 1
  - high |correlation| = high connection between vectors

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LOC localizer: experimental design

Each second:
- new object OR
- new noise OR
- "blank screen" (fixation)

time over experiment

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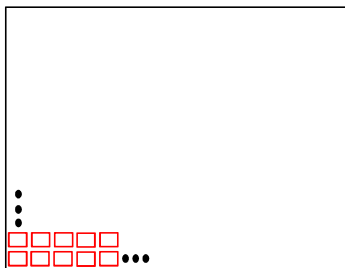## `disp2dB, %F`

- Ordinarily, disp2dB shows highest value as red, lowest value as blue: `disp2dB(mtx)`

- We can change scaling: `disp2dB(mtx,%F)`
  - 64 or higher is red
  - 0 or lower is blue

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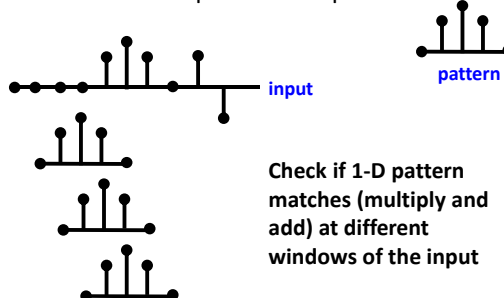## Each combination layer "tiles" visual space

Compute weighted sum (combination) at every location

Called "**convolution**"

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Convolution in Scilab

Think of a 1-D input and 1-D pattern

input

pattern

Check if 1-D pattern matches (multiply and add) at different windows of the input

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