Systems Neuroscience
Matlab, indexing and summarizing

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JMH 332

Last time in Matlab class…

• Compute rates for each 100ms window:

```
rate(1)=sum(spikes(6,1:100))/0.1;
rate(2)=sum(spikes(6,101:200))/0.1;
rate(3)=sum(spikes(6,201:300))/0.1;
rate(4)=sum(spikes(6,301:400))/0.1;
rate(5)=sum(spikes(6,401:500))/0.1;
```

Let's practice generating number intervals!

• Compute with for loop:

```
for i=1:5
  rate(i)=sum(spikes(6,100*(i-1)+(1:100)))/0.1;
end;
```

New data set: object and noise perception

View objects and noise
Task: press button if pic(t) == pic(t-1)
Variables: accuracy, reaction time, object or non-object

Questions:
• What picture was shown?
• What button was pressed?
• How quickly was button pressed?

Results recorded in: `ExptRecord`

`ExptRecord` columns

• `ExptRecord(:,3)` – 0 is noise, 1 is object
• `ExptRecord(:,10)` – 1 should press button, -1 should not press button
• `ExptRecord(:,11)` – 1 subject presses button, 0 subject not press
• `ExptRecord(:,12)` – 0-1000ms, number of ms until button press

```
figure;plot(ExptRecord(:,3));
axis([0, 200, -.5, 1.5]);
figure;plot(sort(ExptRecord(:,12))
```

Exploring your data

- size – data dimensions
- plot – display data contents in figure
- max – maximum value in vector
- min – minimum value in vector
- mean – mean (average) value in vector
- sort – order vector from low to high values
- hist – count frequency of values in vector

- MatVariable(:) – convert AxB matrix into single vector

Finding desired values

`find(vector<number)` `find(c<2)`

Return indices in `vector` that are less than `number`

Example:
```
vector=[5, -1, 0, 12];
smallLocations=find(vector<2);
```
smallLocations contains [2 3]

Comparisons

- `d<2, d>2` strict inequality
- `d<=2, d>=2` semi-inequality
- `d==2` equality

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Combining searches

```
vector=[5, -1, 0, 12];
```

Logic combinations

- `d>5 & d<8` the AND operation – all conditions must be true
- `d<5 | d>8` the OR operation – one or more conditions true

Example: `find(vector<2 & vector>-2)`

Can combine results from multiple matrices:

```
vecB=[12 3 8 0];
find(vector<2 | vecB>4)
```

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Looking at data subsets

- Look at average Reaction Times for all button presses

```
buttonPress = find(ExptRecord(:,11)==1);
mean(ExptRec(buttonPress,12))
```

- Look at average Reaction Time for button press for objects vs noise

```
buttonPressNOISE = find(ExptRecord(:,3)==0 & ExptRecord(:,11)==1);
mean(ExptRec(buttonPressNOISE,12))
```

Equivalent code, broken into more lines:

```
pressVector=ExptRecord(:,11);
noiseVector=ExptRecord(:,3);
buttonPressNOISE = find(noiseVector==0 & pressVector==1);
mean(ExptRec(buttonPressNOISE,12))
```

Looking at data subsets

- Look at how often subject presses button when she should for objects and for noise:

Looking at data subsets

- Look at how often subject presses button when she should for objects and for noise:

```
objI=find(ExptRecord(:,3)==1);
noiseI=find(ExptRecord(:,3)==0);

length(find(ExptRecord(objI,10)==ExptRecord(objI,11)))

length(find(ExptRecord(noiseI,10)==ExptRecord(noiseI,11)))
```

…turns out they are equal