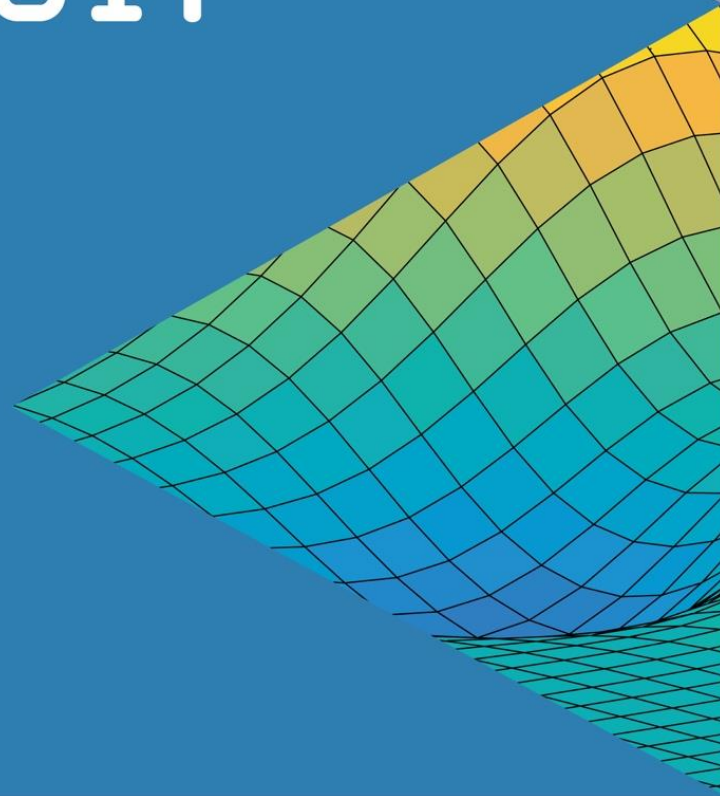


MATLAB EXPO 2017

What's New in MATLAB

R2017a and R2017b

Ned Gulley



What's New

- Live Editor
- Tables (Tall Tables, TimeTables)
- Datastores
- Testing & Compatibility
- App Designer
- Text Analytics
- Data Analytics
- Machine Learning & Deep Learning

R2017a

R2017b

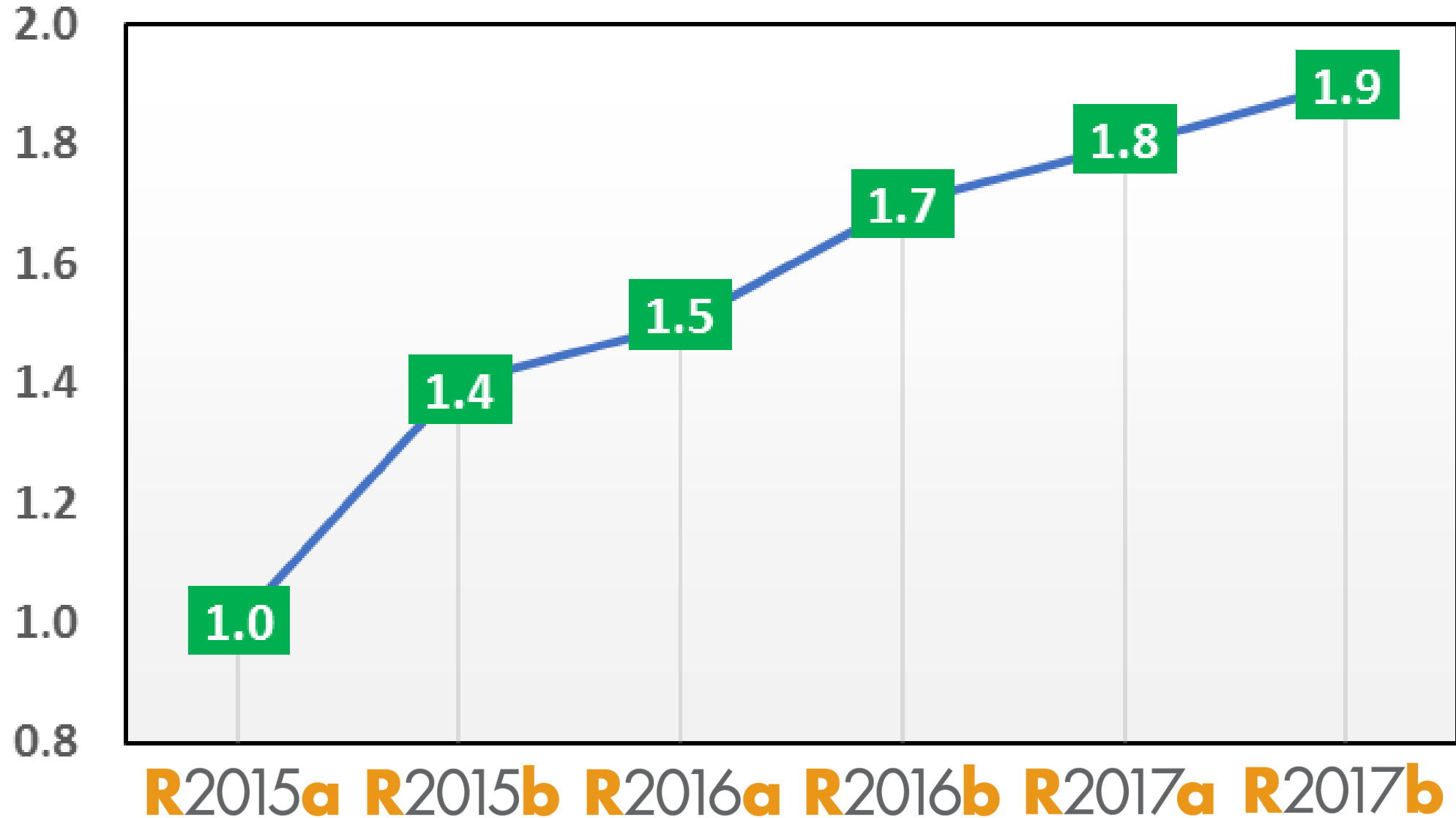
What's New

- Live Editor
- Tables (Tall Tables, TimeTables)
- Datastores
- Testing & Compatibility
- App Designer
- Text Analytics
- Data Analytics
- Machine Learning & Deep Learning

R2017a

R2017b

Average Speedup in Customer Workflows



Football A

Including games

```
db = sqlite
query = 'SE
goals = fet
```

```
t = cell2ta
'Variab
{'Date'
```

```
t(1:3,:)
```

```
ans =
```

```
'2008-0
'2008-0
'2008-0
```

Cody™

MATLAB Central ▾

Problems

My Cody

Players

Create a Problem

More ▾

Help

Problem Groups ⓘ

ASEE Challenge	10
CUP Challenge	11
Card Games	18
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Indexing I	27
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Matrix Manipulation I	16
Matrix Manipulation II	19
Matrix Manipulation III	20

Sort by:

Times 2 - START HERE

24614

Created by Cody Team

Solvers

Tags [intro](#), [math](#)Problem Group [Cody Challenge](#)

Make a checkerboard matrix

6675

Created by Cody Team

Solvers

Tags [square](#), [matrices](#)Problem Group [Cody Challenge](#)

Column Removal

9440

Created by Cody Team

Solvers

Tags [matlab 101](#), [basic matlab](#)Problem Group [Cody Challenge](#)

Triangle Numbers

8950

Created by Cody Team

Solvers

Tags [math](#)Problem Group [Cody Challenge](#)

Problem 661. Spot the outlier

All points except for one lie on a line. Which one is the outlier?

Example:

You are given a list of x-y pairs in a column like this:

```
pts = [ 0 1
        0 2
        3 2
        0 3
        0 4 ]
```

You would return the number 3, since the third point is the only one that is non-collinear with the other points. All the others are on the y-axis.

```
outlier = 3
```

[Solve](#)

Spot the Outlier

Cody Problem 661.

Which point is not on the line?

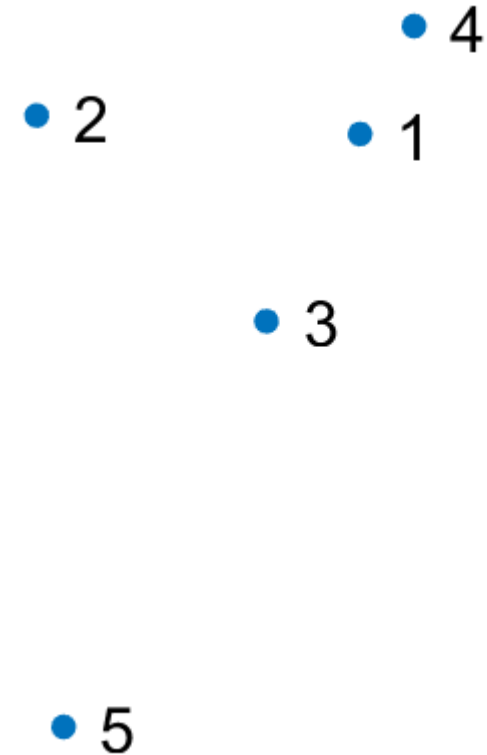
```
pts = [ 0.43    0.85  
        -1.77   0.98  
        -0.21  -0.42  
         0.79   1.59  
        -1.59  -3.18 ]
```

Spot the Outlier

Cody Problem 661.

Which point is not on the line?

```
pts = [ 0.43    0.85  
       -1.77   0.98  
       -0.21  -0.42  
        0.79   1.59  
       -1.59  -3.18 ]
```

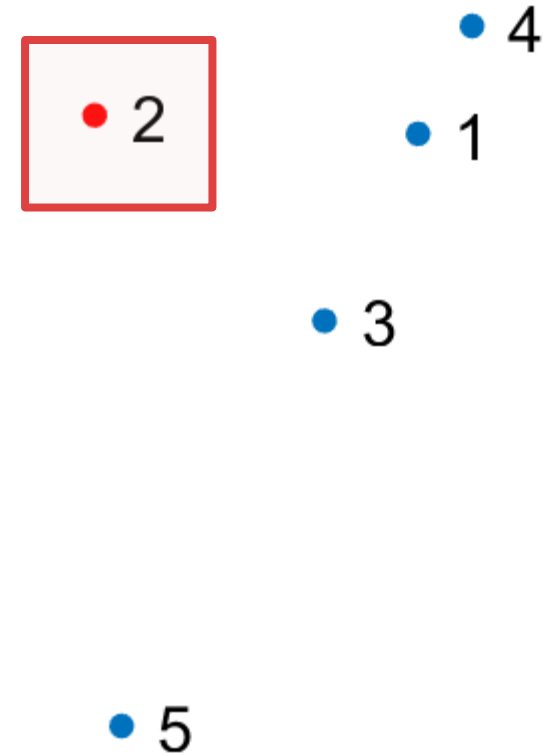


Spot the Outlier

Cody Problem 661.

Which point is not on the line?

```
pts = [ 0.43  0.85  
       -1.77  0.98  
       -0.21 -0.42  
        0.79  1.59  
       -1.59 -3.18 ]
```



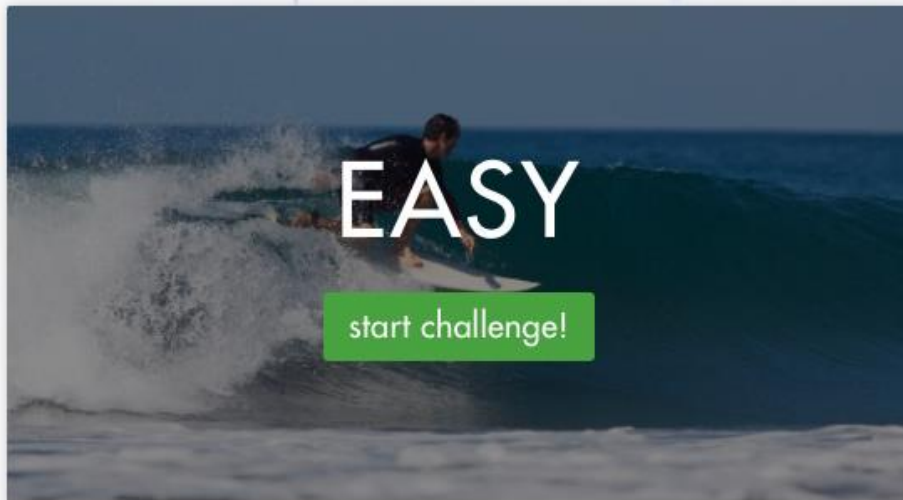
5 YEARS OF CODY

Cody is an online MATLAB problem-solving game that helps you sharpen your programming skills and learn from solutions provided by others. Join the fun as we celebrate Cody's fifth anniversary with a pair of community-contributed problem sets specially designed to offer a variety of challenges for novice and experienced programmers alike.



Complete both problem sets before Jan. 1st to win a limited edition badge.

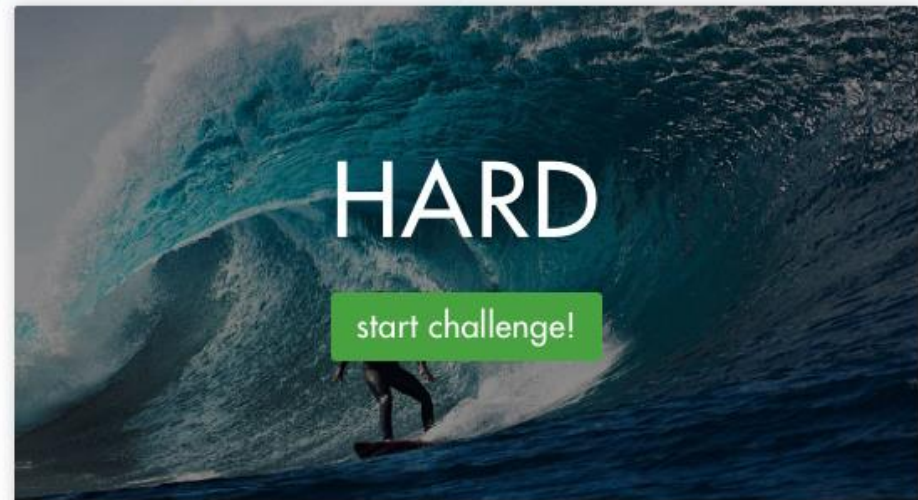
45 DAYS 23 HOURS 59 MINS 59 SECS



RECENT FINISHERS



MY PROGRESS



RECENT FINISHERS



MY PROGRESS



Live Editor

Computational documents

- Explore and analyze
 - Context-aware coding guides **R2017b**
 - See results inline or side-by-side
 - Interactive plots with automatic MATLAB code generation
- Tell stories
 - Add rich text formatting, images, and hyperlinks
 - Interactively enter equations
 - Save directly to PDF, HTML, and LaTeX **R2017b**
 - High-resolution plots in PDF output

Live Editor - \\mathworks\public\Ned_Gulley\share\Sunflowers\sunflowers.mlx *

Sunflower Seeds

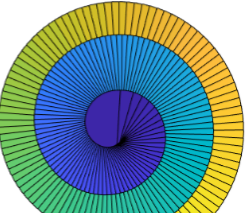
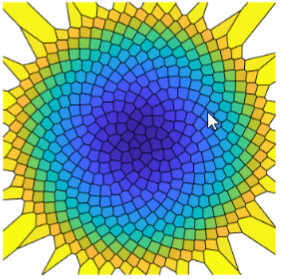
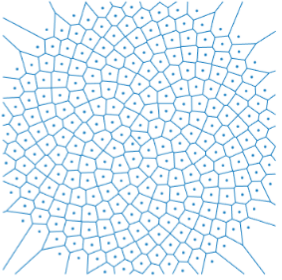
The Fibonacci sequence can give us some insight into sunflower seeds.































```
1 phi = (sqrt(5)+1)/2;
2 c = phi;
3 numSeeds = 1000;
4
5 d = 2*pi/c;
6 theta = 0:d:numSeeds;
7 r = sqrt(theta);
8 [x,y] = pol2cart(theta,r);
9
10 voronoi(x,y)
11
12 axis square
13 axis(30*[-1 1 -1 1])
14 axis off
```

```
15 numSeeds = 2000;
16 c = 1.618034;
17 plotSunflower(numSeeds,c);
18 colormap(parula)
```

```
19 numSeeds = 2000;
20 c = 1.01;
21 plotSunflower(numSeeds,c);
```

```
22 function plotSunflower(numSeeds,c)
23     d = 2*pi/c;
24     theta = 0:d:numSeeds;
25     r = sqrt(theta);
26     [x,y] = pol2cart(theta,r);
27     [v,c] = voronoiin([x',y']);
28
29     cla
30     for i = 1:length(c)
31         if all(c(i)~=1)
32             % If at least one index is 1, then it is an open re
33             % infinity) and we can't patch it
34             xp = v(c(i),1);
35             yp = v(c(i),2);
36             % use color index i.
37             patch(xp,yp,i);
38         end
39     end
40 end
```




Name	Date modified	Type	Size
 cody_2012_02	9/19/2017 6:37 PM	Microsoft Excel C...	1,330 KB
 cody_2012_03	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB
 cody_2012_04	9/19/2017 6:43 PM	Microsoft Excel C...	618 KB
 cody_2012_05	9/19/2017 6:45 PM	Microsoft Excel C...	408 KB
 cody_2012_06	9/19/2017 6:48 PM	Microsoft Excel C...	439 KB
 cody_2012_07	9/19/2017 6:51 PM	Microsoft Excel C...	659 KB
 cody_2012_08	9/19/2017 6:53 PM	Microsoft Excel C...	490 KB
 cody_2012_09	9/19/2017 6:56 PM	Microsoft Excel C...	417 KB
 cody_2012_10	9/19/2017 6:59 PM	Microsoft Excel C...	516 KB
 cody_2012_11	9/19/2017 7:02 PM	Microsoft Excel C...	608 KB
 cody_2012_12	9/19/2017 7:04 PM	Microsoft Excel C...	517 KB
 cody_2013_01	9/19/2017 7:07 PM	Microsoft Excel C...	629 KB
 cody_2013_02	9/19/2017 7:10 PM	Microsoft Excel C...	478 KB
 cody_2013_03	9/19/2017 7:12 PM	Microsoft Excel C...	638 KB
 cody_2013_04	9/19/2017 7:15 PM	Microsoft Excel C...	512 KB
 cody_2013_05	9/19/2017 7:18 PM	Microsoft Excel C...	592 KB
 cody_2013_06	9/19/2017 7:20 PM	Microsoft Excel C...	709 KB
 cody_2013_07	9/19/2017 7:23 PM	Microsoft Excel C...	978 KB
 cody_2013_08	9/19/2017 7:26 PM	Microsoft Excel C...	825 KB
 cody_2013_09	9/19/2017 7:29 PM	Microsoft Excel C...	530 KB
 cody_2013_10	9/19/2017 7:31 PM	Microsoft Excel C...	684 KB
 cody_2013_11	9/19/2017 7:34 PM	Microsoft Excel C...	784 KB
 cody_2013_12	9/19/2017 7:37 PM	Microsoft Excel C...	621 KB
 cody_2014_01	9/19/2017 7:39 PM	Microsoft Excel C...	616 KB
 cody_2014_02	9/19/2017 7:42 PM	Microsoft Excel C...	671 KB
 cody_2014_03	9/19/2017 7:45 PM	Microsoft Excel C...	545 KB
 cody_2014_04	9/19/2017 7:47 PM	Microsoft Excel C...	417 KB
 cody_2014_05	9/19/2017 7:50 PM	Microsoft Excel C...	482 KB
 cody_2014_06	9/19/2017 7:53 PM	Microsoft Excel C...	679 KB
 cody_2014_07	9/19/2017 7:55 PM	Microsoft Excel C...	691 KB
cody_2014_08	9/19/2017 7:58 PM	Microsoft Excel C...	545 KB

Name	Date modified	Type	Size						
cody_2012_02	9/19/2017 6:37 PM	Microsoft Excel C...	1,330 KB						
cody_2012_03	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_04	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_05	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_06	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_07	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_08	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_09	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_10	9/19/2017 6:40 PM	Microsoft Excel C...	547 KB						
cody_2012_11	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2012_12	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_01	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_02	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_03	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_04	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_05	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_06	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_07	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_08	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_09	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_10	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_11	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2013_12	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2014_01	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2014_02	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2014_03	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2014_04	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2014_05	9/19/2017 7:00 PM	Microsoft Excel C...	547 KB						
cody_2014_06	9/19/2017 7:53 PM	Microsoft Excel C...	679 KB						
cody_2014_07	9/19/2017 7:55 PM	Microsoft Excel C...	691 KB						
cody_2014_08	9/19/2017 7:58 PM	Microsoft Excel C...	545 KB						

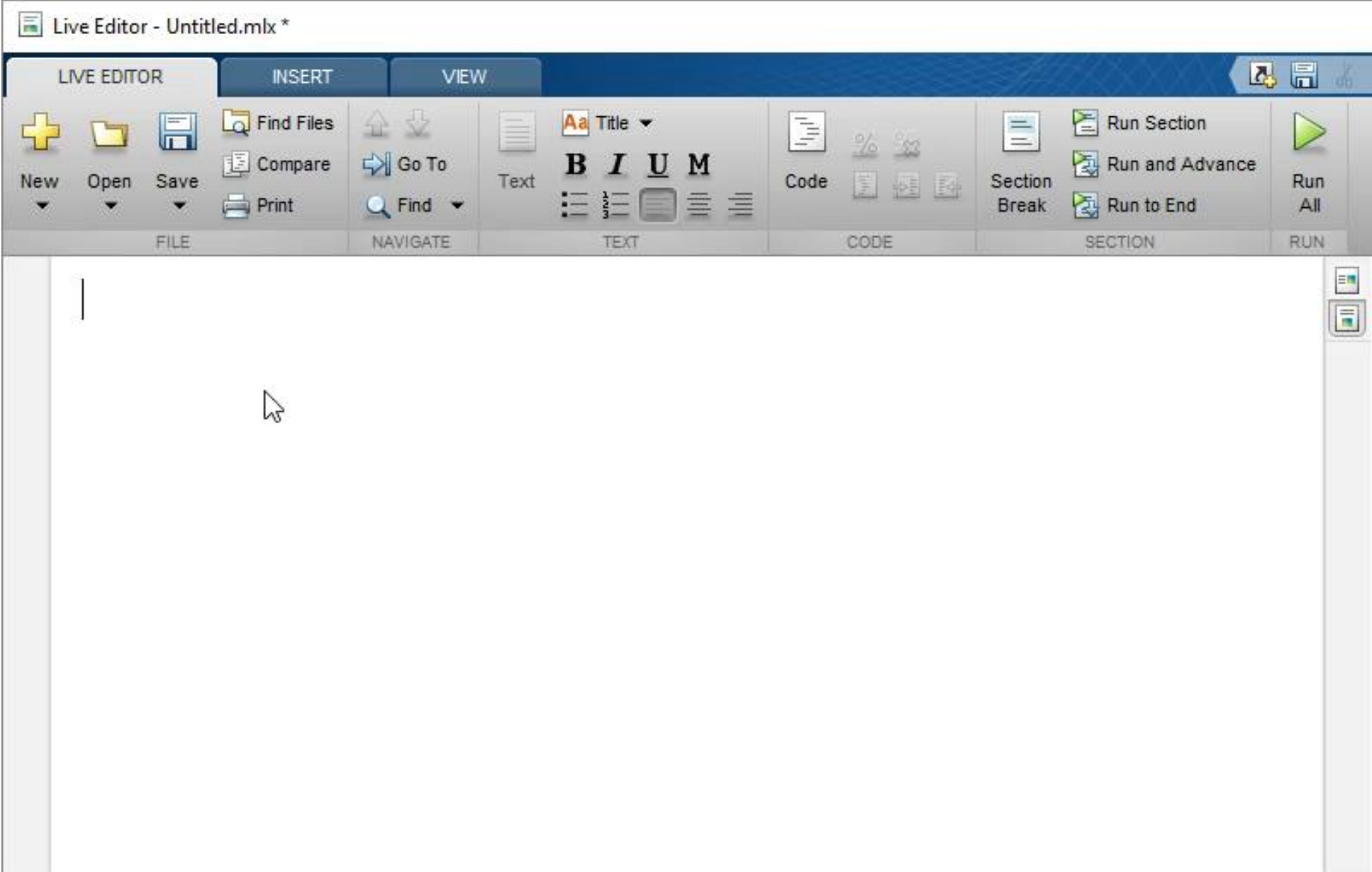
	A	B	C	D	E	F	G
1	created_at	player_id	problem_id		correct	metric	problem_i
2	3/1/2012 0:03	540	142	54490	0	24	129
3	3/1/2012 0:06	43	429	54491	1	33	369
4	3/1/2012 0:07	540	142	54492	0	24	129
5	3/1/2012 0:09	540	142	54493	1	24	129
6	3/1/2012 0:12	540	358	54494	1	10	309
7	3/1/2012 0:18	2025	22	54495	1	21	22
8	3/1/2012 0:24	540	325	54496	0	0	278
9	3/1/2012 0:25	540	325	54497	0	0	278
10	3/1/2012 0:26	540	325	54498	0	0	278
11	3/1/2012 0:29	19	429	54499	1	42	369
12	3/1/2012 0:45	540	325	54500	0	0	278
13	3/1/2012 0:48	307	419	54501	0	24	361
14	3/1/2012 0:51	307	419	54502	1	24	361
15	3/1/2012 0:54	1876	149	54503	1	10	136
16	3/1/2012 1:05	1675	255	54504	0	83	225
17	3/1/2012 1:06	1675	255	54505	0	83	225
18	3/1/2012 1:06	1675	255	54506	0	83	225

```
fileID = fopen(filename);  
C = textscan(fileID, '%s %s %f32 %d8 %u %f %f %s %f');  
fclose(fileID);  
whos C
```



```
fileID = fopen(filename);  
C = textscan(fileID, '%s %s %f32 %d8 %u %f %f %s %f');  
fclose(fileID);  
whos C
```

Animation



Cody Analysis

```
tbl = readtable('cody_2012_03.csv')
```

```
tbl = 13694x7 table
```

<u>created_at</u>	<u>player_id</u>	<u>problem_id</u>	<u>id</u>	<u>correct</u>	<u>metric</u>	<u>problem_index</u>
01-Mar-2012 00:03:22	540	142	54490	0	24	129
01-Mar-2012 00:06:38	43	429	54491	1	33	369
01-Mar-2012 00:07:13	540	142	54492	0	24	129
01-Mar-2012 00:09:30	540	142	54493	1	24	129
01-Mar-2012 00:12:23	540	358	54494	1	10	309
01-Mar-2012 00:18:17	2025	22	54495	1	21	22
01-Mar-2012 00:24:19	540	325	54496	0	0	278
01-Mar-2012 00:25:40	540	325	54497	0	0	278
01-Mar-2012 00:26:54	540	325	54498	0	0	278
01-Mar-2012 00:29:24	19	429	54499	1	42	369
01-Mar-2012 00:45:53	540	325	54500	0	0	278
01-Mar-2012 00:48:23	307	419	54501	0	24	361
01-Mar-2012 00:51:42	307	419	54502	1	24	361
01-Mar-2012 00:54:50	1076	140	54503	1	10	126

Cody Analysis

```
1 tbl = readtable('cody_2012_03.csv')
```

```
tbl = 13694x7 table
```

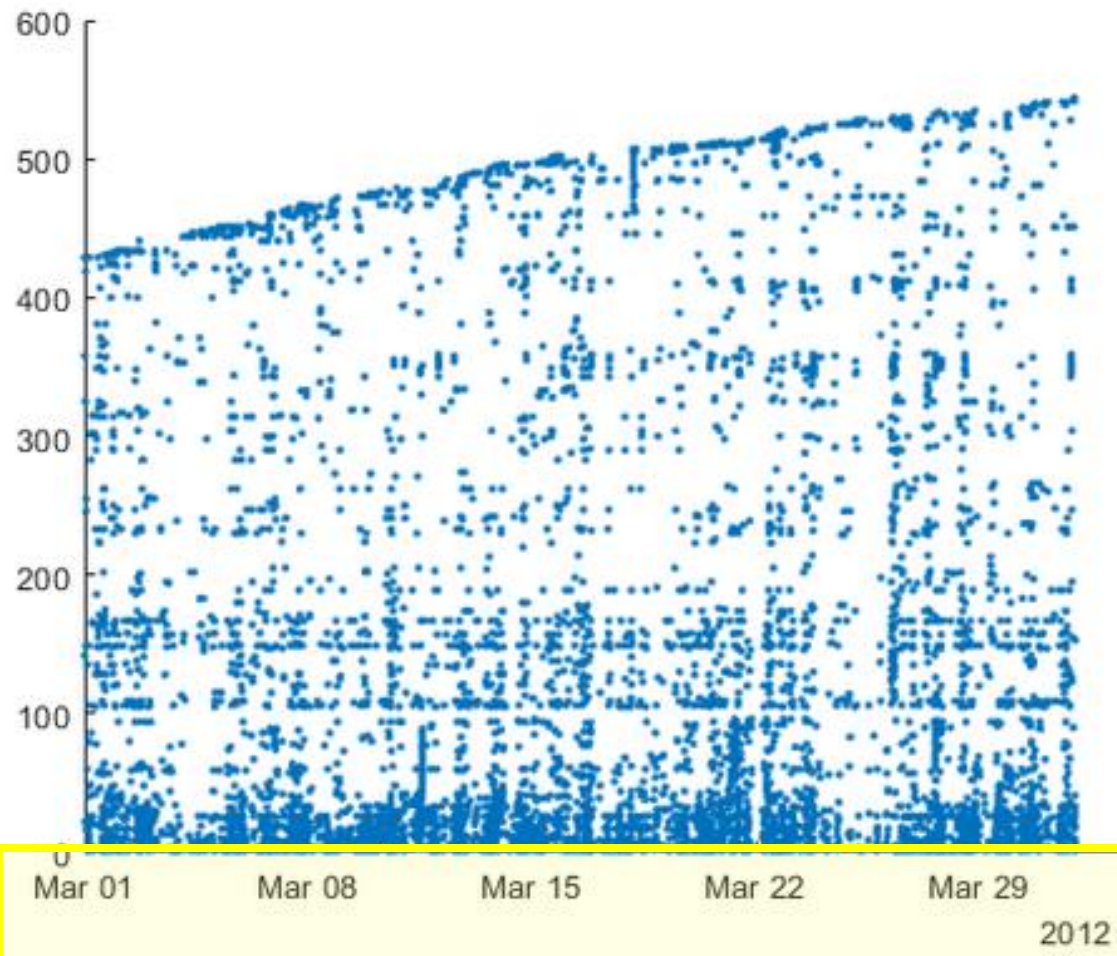
	created_at	player_id	problem_id	id	correct	metric	problem_index
1	01-Mar-20...	540	142	54490	0	24	129
2	01-Mar-20...	43	429	54491	1	33	369
3	01-Mar-20...	540	142	54492	0	24	129
4	01-Mar-20...	540	142	54493	1	24	129
5	01-Mar-20...	540	358	54494	1	10	309
6	01-Mar-20...	2025	22	54495	1	21	22
7	01-Mar-20...	540	325	54496	0	0	278
8	01-Mar-20...	540	325	54497	0	0	278
9	01-Mar-20...	540	325	54498	0	0	278
10	01-Mar-20	19	429	54499	1	42	369

```
2 height(tbl)
```

```
ans = 13694
```


3

```
scatter(tbl.created_at,tbl.problem_id, '.')
```

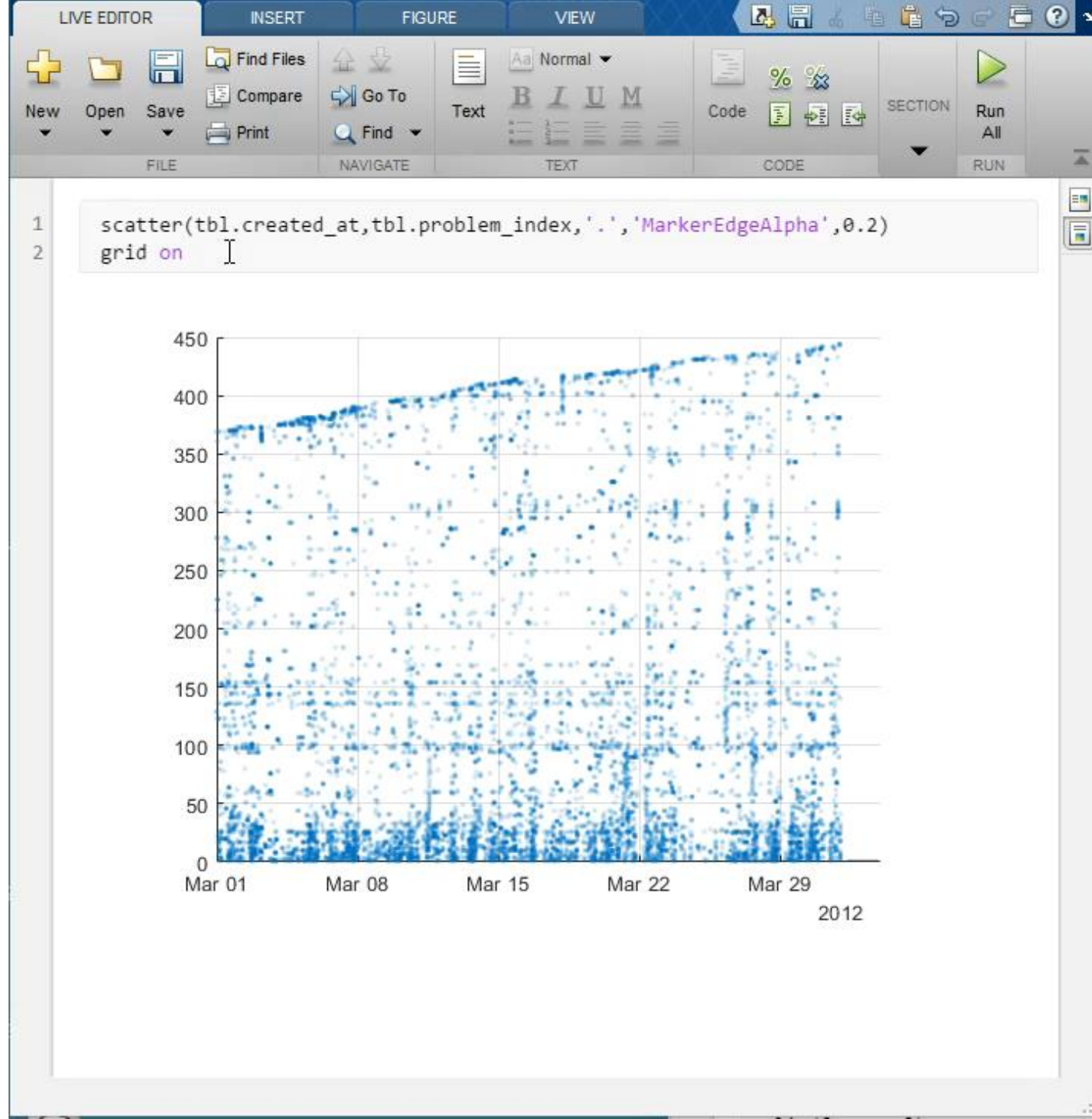


```
3 scatter(tbl.created_at,tbl.problem_id, '.', 'MarkerEdgeAlpha'  
4 scatter(x,y,markertype, 'filled', options)  
5  
6  
7  
8  
9  
10  
11  
12
```

name-value pairs (Optional) ◀ 2 of 2

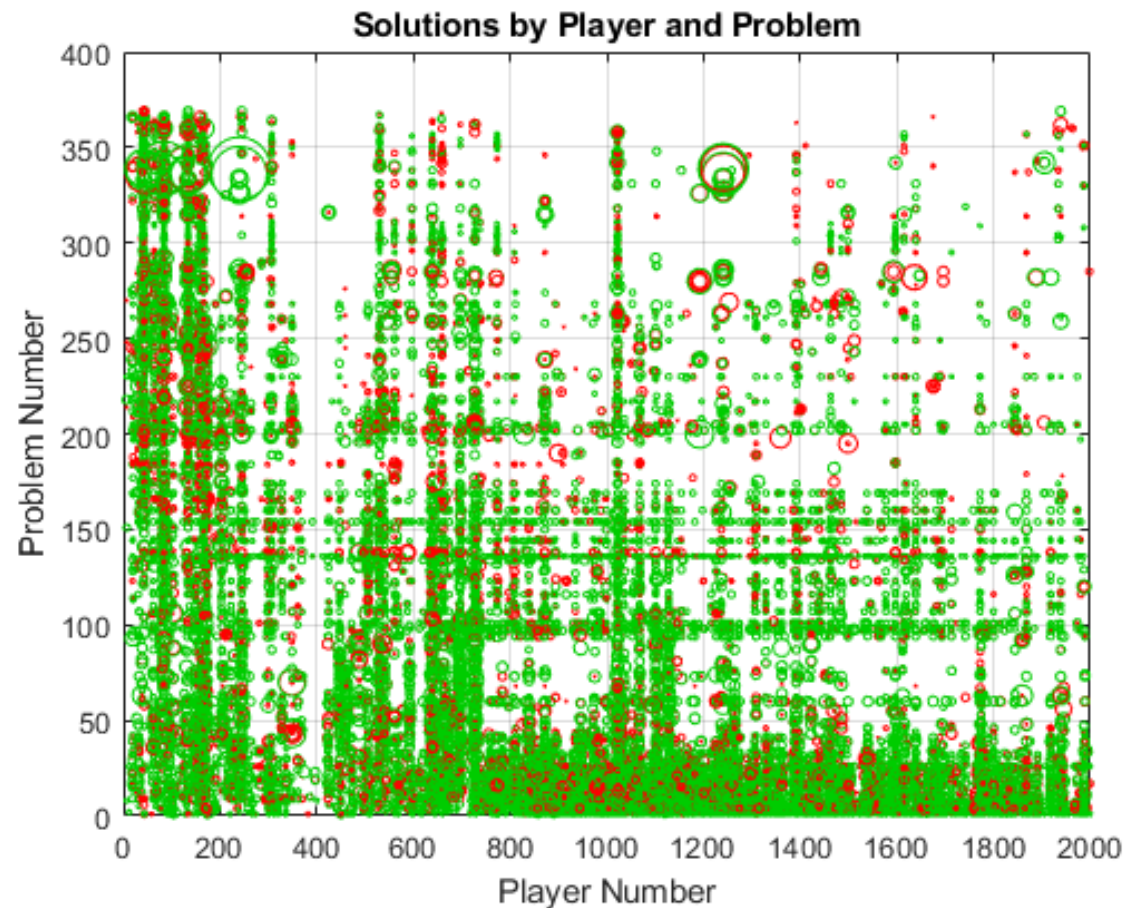
- abc 'Marker'
- abc 'MarkerEdgeAlpha'
- abc 'MarkerEdgeColor'
- abc 'MarkerFaceAlpha'
- abc 'MarkerFaceColor'

Animation




```
scatter(tbl.player_id,tbl.problem_index,abs(tbl.metric)/5+1,tbl.correct,'o')
colormap([1 0 0;0 0.8 0])
title('Solutions by Player and Problem')
xlabel('Player Number')
ylabel('Problem Number')
box on
grid on

xlim([0 2000])
ylim([0 400])
```



Cody Analysis

```
1 % tbl = readtable('cody_2012_03.csv')  
2 % height(tbl)
```

```
3 ds = datastore('cody_*.csv');  
4 tbl = tall(ds);
```

Starting parallel pool (parpool) using the 'local' profile ...
connected to 6 workers.

```
5 height(tbl)
```

ans =

tall double

?

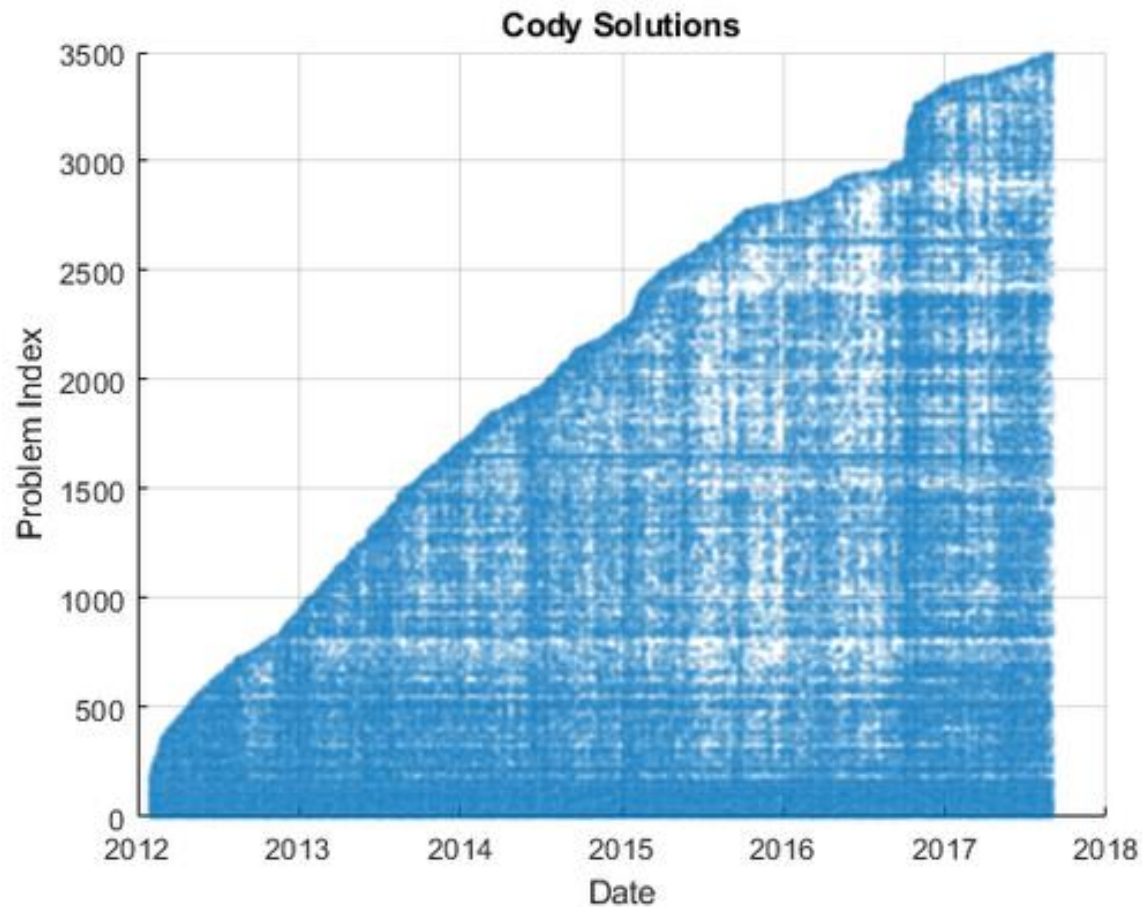
Preview deferred. [Learn more.](#)

```
6 gather(height(tbl))
```

Evaluating tall expression using the Parallel Pool 'local':

ans = 1108534


```
8 scatter(tbl.created_at,tbl.problem_index, '.', 'MarkerEdgeAlpha',0.2)
9
10 grid on
11 title('Cody Solutions')
12 xlabel('Date')
13 ylabel('Problem Index')
14
15 xlim([datetime(2012,1,1)...
16       datetime(2018,1,1)])
17 ylim([0 3500])
```



```
tt = table2timetable(tbl)
```

```
tt =
```

```
M×6 tall timetable
```

created_at	player_id	problem_id	id	correct	metric	p
01-Feb-2012 00:00:07	820	94	20399	1	25	9
01-Feb-2012 00:00:23	820	94	20400	1	24	9
01-Feb-2012 00:00:31	562	30	20401	0	22	3
01-Feb-2012 00:00:36	361	31	20402	1	14	3
01-Feb-2012 00:01:02	562	30	20403	0	24	3
01-Feb-2012 00:01:12	562	30	20404	1	24	3
01-Feb-2012 00:01:25	562	30	20405	1	23	3
01-Feb-2012 00:01:30	361	60	20406	0	22	6
:	:	:	:	:	:	:
:	:	:	:	:	:	:

TimeTables

```
load(fullfile(matlabroot,'examples','matlab','indoors'));  
load(fullfile(matlabroot,'examples','matlab','outdoors'));
```

```
in = indoors(1:5,:)
```

in = 5x2 timetable

	Humidity	AirQuality
1 2015-11-15 00:00:24	36	80
2 2015-11-15 01:13:35	36	80
3 2015-11-15 02:26:47	37	79
4 2015-11-15 03:39:59	37	82
5 2015-11-15 04:53:11	36	80

```
out = outdoors(1:5,:)
```

out = 5x3 timetable

	Humidity	TemperatureF	PressureHg
1 2015-11-15 00:00:24	49.0000	51.3000	29.6100
2 2015-11-15 01:30:24	48.9000	51.5000	29.6100
3 2015-11-15 03:00:24	48.9000	51.5000	29.6100
4 2015-11-15 04:30:24	48.8000	51.5000	29.6100
5 2015-11-15 06:00:24	48.7000	51.5000	29.6000

Indoor
Humidity, Air Quality

Outdoor
Humidity, Temperature, Pressure

TimeTables

```
load(fullfile(matlabroot,'examples','matlab','indoors'));  
load(fullfile(matlabroot,'examples','matlab','outdoors'));
```

```
in = indoors(1:5,:)
```

in = 5x2 timetable

	Humidity	AirQuality
1 2015-11-15 00:00:24	36	80
2 2015-11-15 01:13:35	36	80
3 2015-11-15 02:26:47	37	79
4 2015-11-15 03:39:59	37	82
5 2015-11-15 04:53:11	36	80

```
out = outdoors(1:5,:)
```

out = 5x3 timetable

	Humidity	TemperatureF	PressureHg
1 2015-11-15 00:00:24	49.0000	51.3000	29.6100
2 2015-11-15 01:30:24	48.9000	51.5000	29.6100
3 2015-11-15 03:00:24	48.9000	51.5000	29.6100
4 2015-11-15 04:30:24	48.8000	51.5000	29.6100
5 2015-11-15 06:00:24	48.7000	51.5000	29.6000

Synchronize!

```
tt = synchronize(indoors,outdoors);  
tt(1:5,:)
```

ans = 5x5 timetable

	Humidity_in...	AirQuality	Humidity_ou...	TemperatureF
1 2015-11-15 00:00:24	36	80	49.0000	51.3000
2 2015-11-15 01:13:35	36	80	NaN	NaN
3 2015-11-15 01:30:24	NaN	NaN	48.9000	51.5000
4 2015-11-15 02:26:47	37	79	NaN	NaN
5 2015-11-15 03:00:24	NaN	NaN	48.9000	51.5000

TimeTables

```
load(fullfile(matlabroot,'examples','matlab','indoors'));  
load(fullfile(matlabroot,'examples','matlab','outdoors'));
```

```
in = indoors(1:5,:)
```

in = 5x2 timetable

	Humidity	AirQuality
1 2015-11-15 00:00:24	36	80
2 2015-11-15 01:13:35	36	80
3 2015-11-15 02:26:47	37	79
4 2015-11-15 03:39:59	37	82
5 2015-11-15 04:53:11	36	80

```
out = outdoors(1:5,:)
```

out = 5x3 timetable

	Humidity	TemperatureF	PressureHg
1 2015-11-15 00:00:24	49.0000	51.3000	29.6100
2 2015-11-15 01:30:24	48.9000	51.5000	29.6100
3 2015-11-15 03:00:24	48.9000	51.5000	29.6100
4 2015-11-15 04:30:24	48.8000	51.5000	29.6100
5 2015-11-15 06:00:24	48.7000	51.5000	29.6000

Synchronize with Interpolation

```
ttLinear = synchronize(indoors,outdoors,'union','linear');  
ttLinear(1:5,:)
```

ans = 5x5 timetable

	Humidity_in...	AirQuality	Humidity_ou...	TemperatureF
1 2015-11-15 00:00:24	36.0000	80.0000	49.0000	51.3000
2 2015-11-15 01:13:35	36.0000	80.0000	48.9187	51.4626
3 2015-11-15 01:30:24	36.2297	79.7703	48.9000	51.5000
4 2015-11-15 02:26:47	37.0000	79.0000	48.9000	51.5000
5 2015-11-15 03:00:24	37.0000	80.3777	48.9000	51.5000

TimeTables

```
load(fullfile(matlabroot,'examples','matlab','indoors'));  
load(fullfile(matlabroot,'examples','matlab','outdoors'));
```

```
in = indoors(1:5,:)
```

in = 5x2 timetable

	Humidity	AirQuality
1 2015-11-15 00:00:24	36	80
2 2015-11-15 01:13:35	36	80
3 2015-11-15 02:26:47	37	79
4 2015-11-15 03:39:59	37	82
5 2015-11-15 04:53:11	36	80

```
out = outdoors(1:5,:)
```

out = 5x3 timetable

	Humidity	TemperatureF	PressureHg
1 2015-11-15 00:00:24	49.0000	51.3000	29.6100
2 2015-11-15 01:30:24	48.9000	51.5000	29.6100
3 2015-11-15 03:00:24	48.9000	51.5000	29.6100
4 2015-11-15 04:30:24	48.8000	51.5000	29.6100
5 2015-11-15 06:00:24	48.7000	51.5000	29.6000

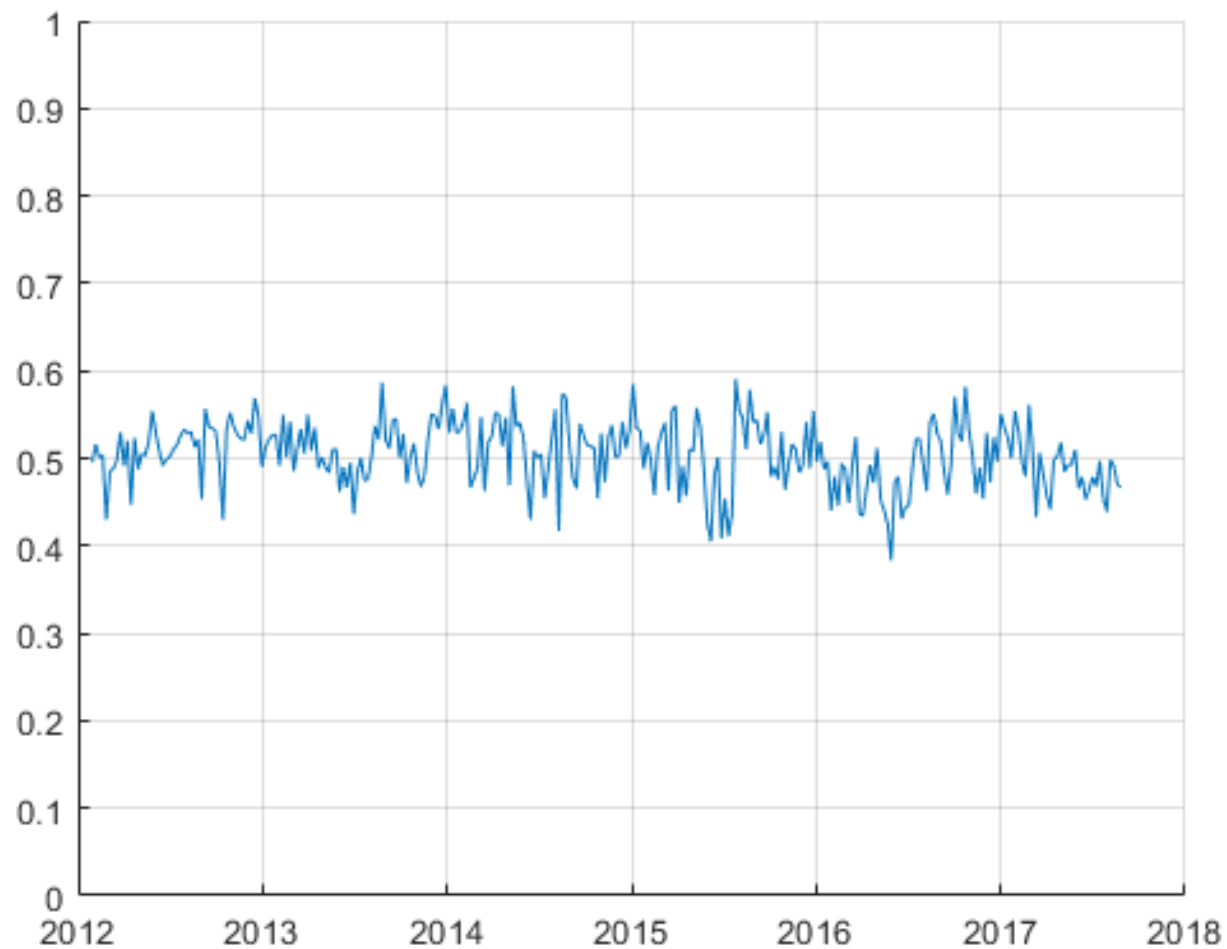
Retime

```
newTimes = min(ttLinear.Time):minutes(30):max(ttLinear.Time);  
ttEven = retime(ttLinear,newTimes,'spline');  
ttEven(1:5,:)
```

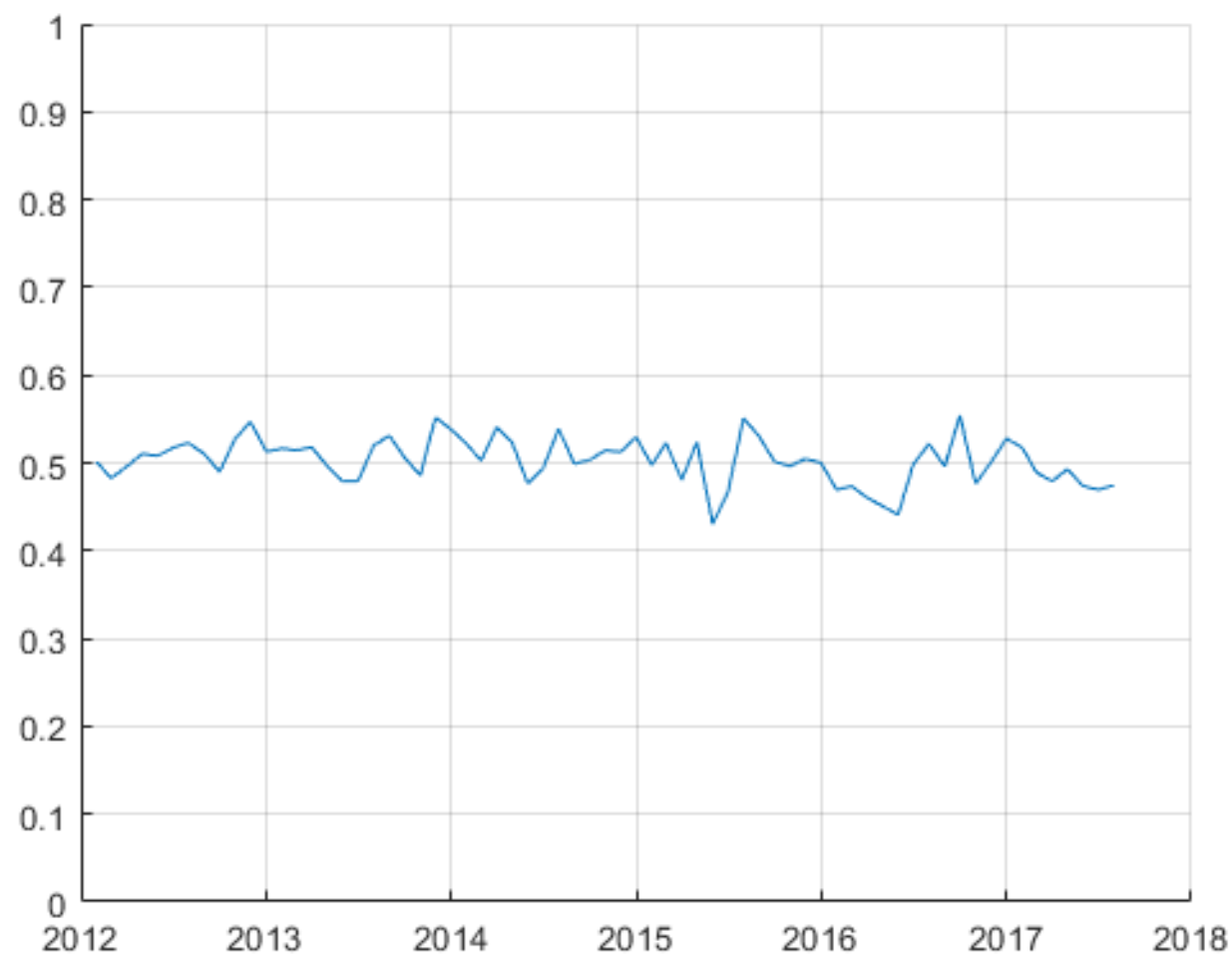
ans = 5x5 timetable

	Humidity_in...	AirQuality	Humidity_ou...	TemperatureF
1 2015-11-15 00:00:24	36.0000	80.0000	49.0000	51.3000
2 2015-11-15 00:30:24	35.7621	80.0481	48.9830	51.3312
3 2015-11-15 01:00:24	35.8674	80.0747	48.9383	51.4225
4 2015-11-15 01:30:24	36.2297	79.7703	48.9000	51.5000
5 2015-11-15 02:00:24	36.7173	79.0935	48.8924	51.5124

```
30 ttCorrect = tt(:, 'correct');
31 ttMean     = retime(ttCorrect, 'weekly', 'mean');
32
33 plot(ttMean.created_at, ttMean.correct)
34 xlim([datetime(2012,1,1) datetime(2018,1,1)])
35 ylim([0 1])
36 grid on
```



```
37 ttCorrect = tt(:, 'correct');
38 ttMean    = retime(ttCorrect, 'monthly', 'mean');
39
40 plot(ttMean.created_at, ttMean.correct)
41 xlim([datetime(2012,1,1) datetime(2018,1,1)])
42 ylim([0 1])
43 grid on
```



48

```
m = mean(tt.correct)
```

```
m =
```

```
  tall double
```

```
  ?
```

Preview deferred. [Learn more.](#)

49

```
gather(m)
```

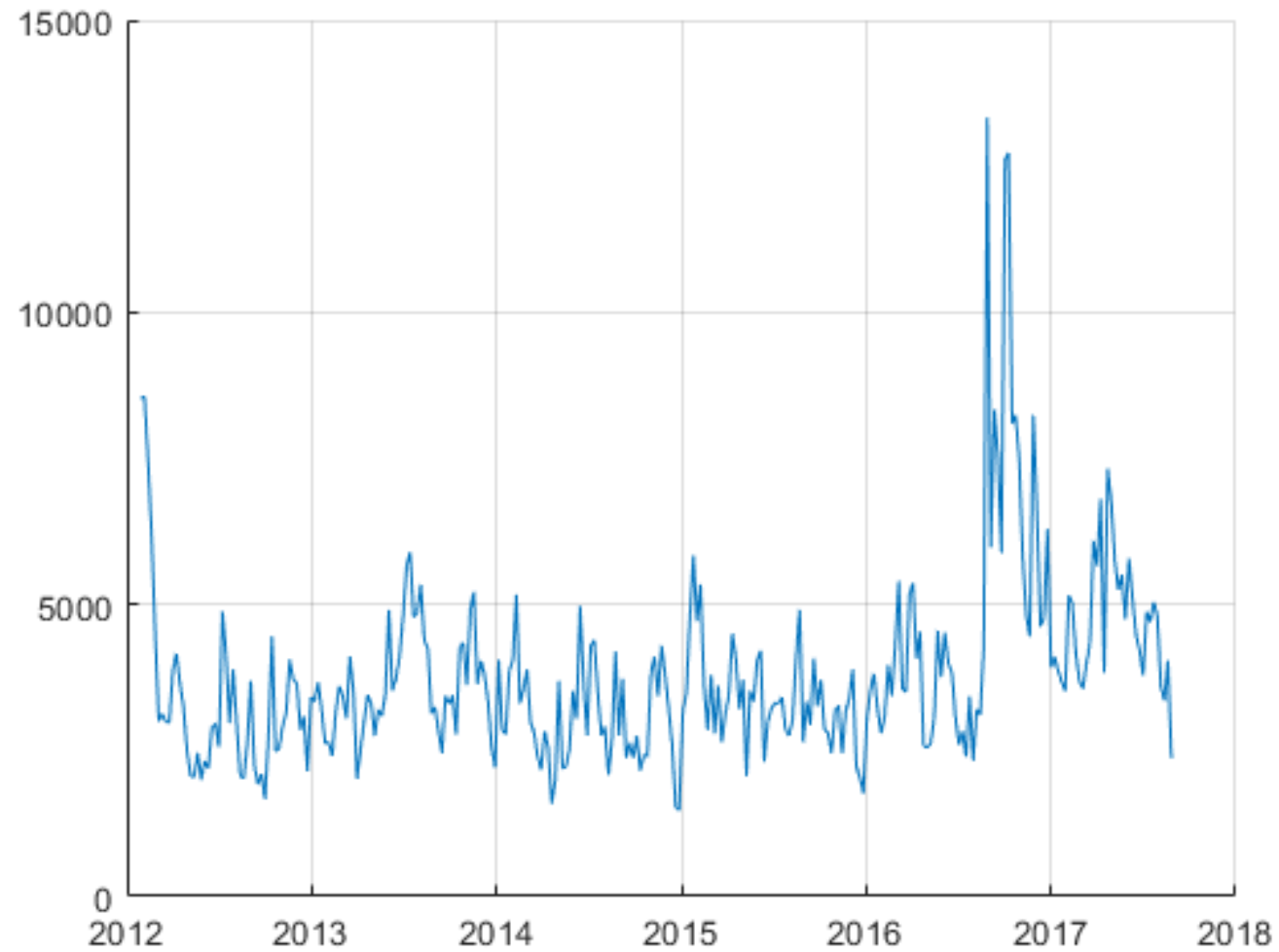
```
Evaluating tall expression using the Parallel Pool 'local':
```

```
- Pass 1 of 1: Completed in 3 sec
```

```
Evaluation completed in 3 sec
```

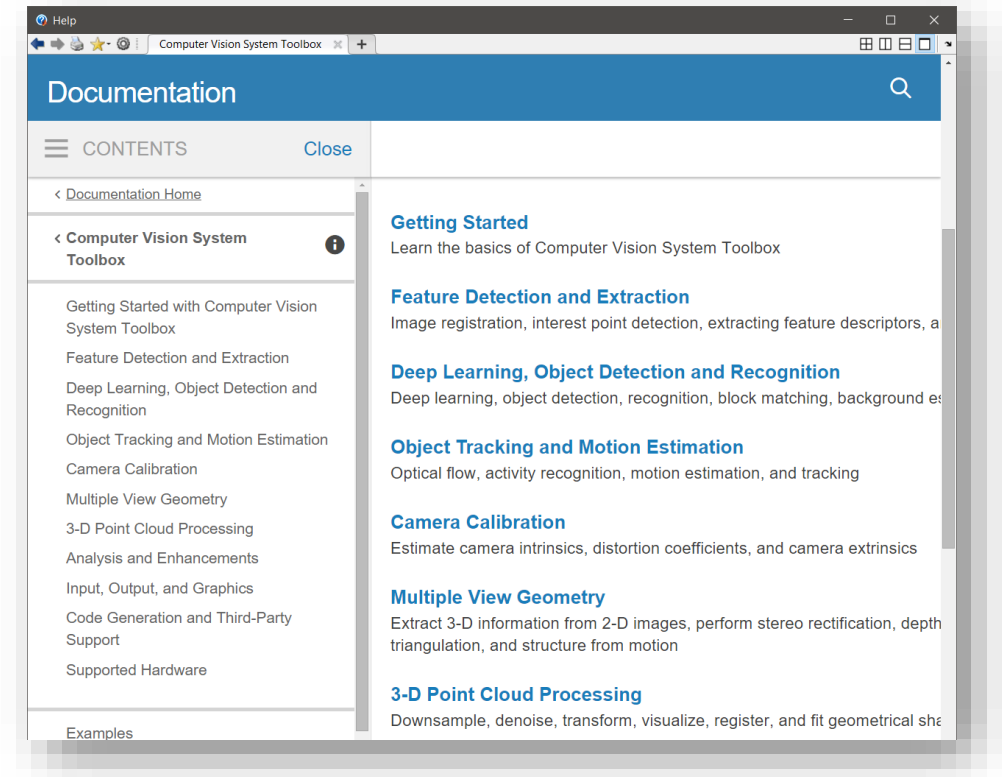
```
ans = 0.5021
```

```
46 ttCount = retime(ttCorrect, 'weekly', 'count');
47 plot(ttCount.created_at, ttCount.correct)
48 xlim([datetime(2012,1,1) datetime(2018,1,1)])
49 ylim([0 15000])
50 grid on
```



Redesigned Documentation

- More examples
- More domain-specific information
- Improved discoverability
- Release Notes filtering
 - More easily find changes across releases
 - Highlight only changes that have incompatibility considerations



R2015b ▼ to R2016a ▼			
Compatibility Considerations ⚠			
<input checked="" type="checkbox"/> Incompatibilities Only			
Functionality	Result	Use This Instead	Compatibility Considerations
plotyy function	Still runs	yyaxis	Replace all instances of <code>plotyy</code> with <code>yyaxis</code> .
polar function	Still runs	polarplot	Replace all instances of <code>polar</code> with <code>polarplot</code> .
ezplot function	Still runs	fplot	Replace all instances of <code>ezplot</code> with <code>fplot</code> .
ezplot3 function	Still runs	fplot3	Replace all instances of <code>ezplot3</code> with <code>fplot3</code> .

Code Compatibility Report

R2017b

- Tool to help upgrade code to latest and greatest
- Identifies potential compatibility issues
- Hundreds of checks for incompatibilities, errors, and warnings
- More features coming!

Web Browser - (3 Errors) Code Compatibility Report

(3 Errors) Code Compatibility Report

Code Compatibility Report [Top](#) [3 Errors](#) [1 Warning](#) [304 Checks](#) [2 Files](#)

Analysis Date: 05-Sep-2017 14:32:08

MATLAB Version: R2017b

Incompatibility and Syntax Errors

Row	Filename	Line	Description	Details
1	classifyBloodPressure.m	18	TREEFIT has been removed. Use fitctree or fitrtree instead.	Details
2	classifyBloodPressure.m	21	TREEDISP has been removed. Use ClassificationTree or RegressionTree VIEW methods instead.	Details
3	classifyBloodPressure.m	24	TREEVAL has been removed. Use ClassificationTree or RegressionTree PREDICT methods instead.	Details

Warnings and Other Recommendations

Row	Filename	Line	Description	Details
1	classifyBloodPressure.m	7	RAND or RANDN with the 'seed', 'state', or 'twister' inputs is not recommended. Use RNG instead.	Details

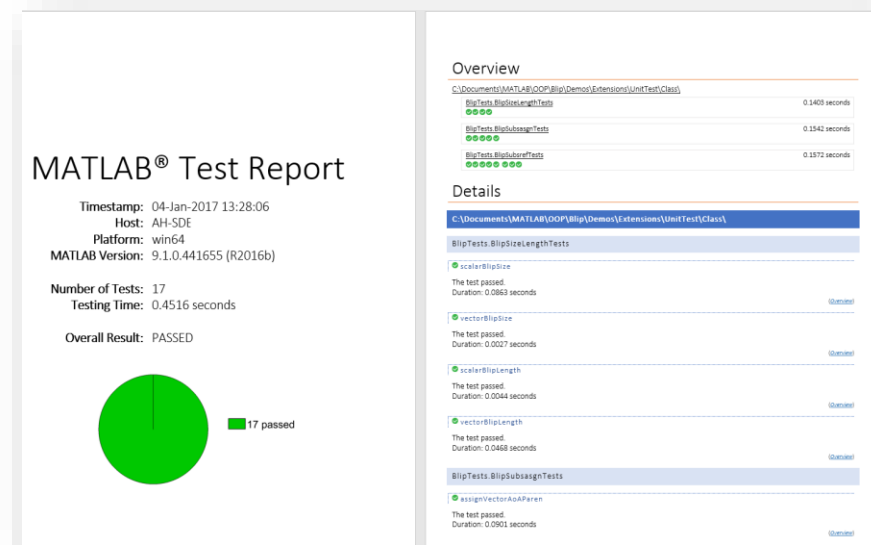
Link to documentation for updates

Go directly to the line of code

Test Frameworks

- MATLAB Unit Testing Framework
 - Test your code early and often
 - xUnit style framework
 - Script / function / class based testing
 - Works with continuous integration servers
 - Automatic reporting
 - Mocking framework
 - Capture screenshots
- Performance Testing Framework
 - Time MATLAB code automatically
 - Track performance over time

R2017a



MATLAB® Test Report

Timestamp: 04-Jan-2017 13:28:06
Host: AH-SDE
Platform: win64
MATLAB Version: 9.1.0.441655 (R2016b)

Number of Tests: 17
Testing Time: 0.4516 seconds

Overall Result: PASSED

17 passed

Test Name	Duration
BlipTests.BlipSizeLengthTests	0.1403 seconds
BlipTests.BlipAssignTests	0.1542 seconds
BlipTests.BlipSubarrayTests	0.1572 seconds

Details

C:\Users\ahsde\Documents\MATLAB\OODP\Blip\Demo\Extensions\UnitTest\Class

BlipTests.BlipSizeLengthTests

- scalarBlipSize: The test passed. Duration: 0.0863 seconds
- vectorBlipSize: The test passed. Duration: 0.0027 seconds
- scalarBlipLength: The test passed. Duration: 0.0044 seconds
- vectorBlipLength: The test passed. Duration: 0.0468 seconds

BlipTests.BlipAssignTests

- assignVectorAsAParen: The test passed. Duration: 0.0953 seconds

```
suite = matlab.unittest.TestSuite.fromPackage('BlipTests')  
%% Run Tests  
% Run the tests and see results  
results = run(runner,suite)
```

1×17 **TestResult** array with properties:

- Name
- Passed
- Failed
- Incomplete
- Duration
- Details

Totals:
17 Passed, 0 Failed, 0 Incomplete.
1.0937 seconds testing time.

allow you to cu
xtOutput

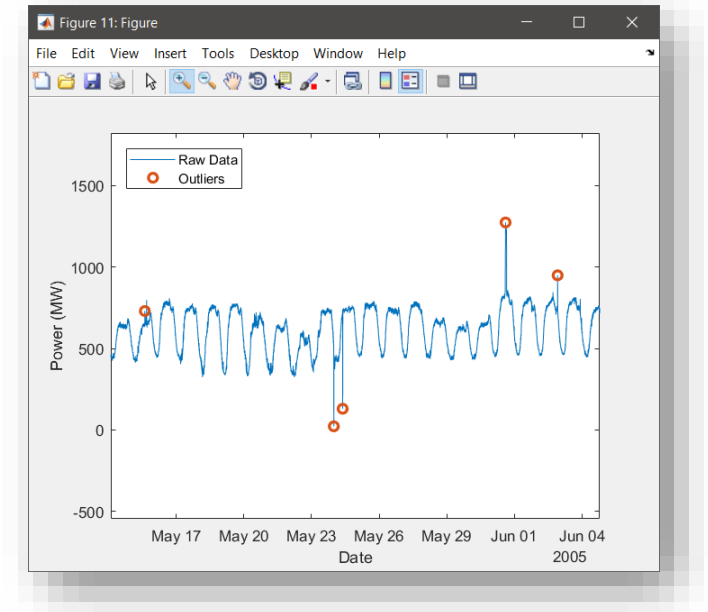
Data Preprocessing

Easier ways to clean up messy data

- Smooth noisy data with filtering or local regression using `smoothdata`
- More easily deal with outliers with `isoutlier` and `filloutliers`

R2017a

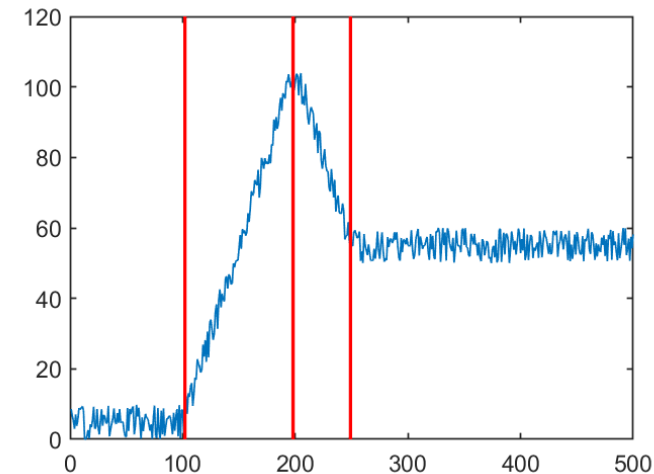
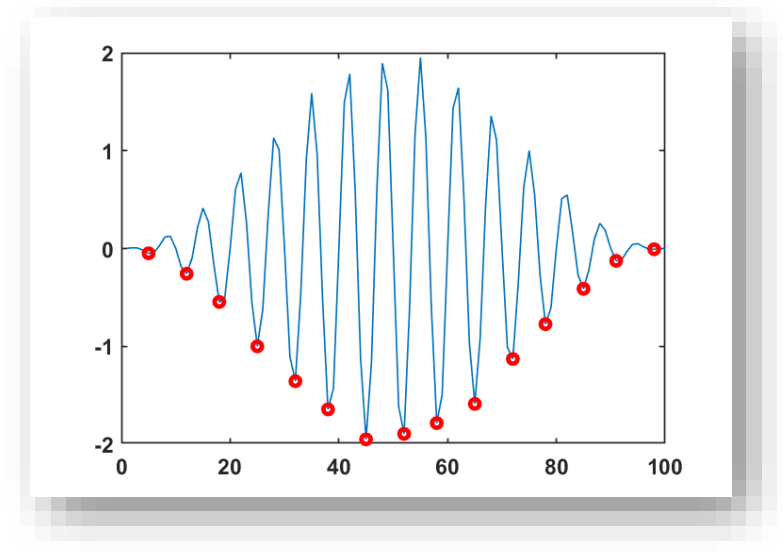
R2017a



Analyze Data

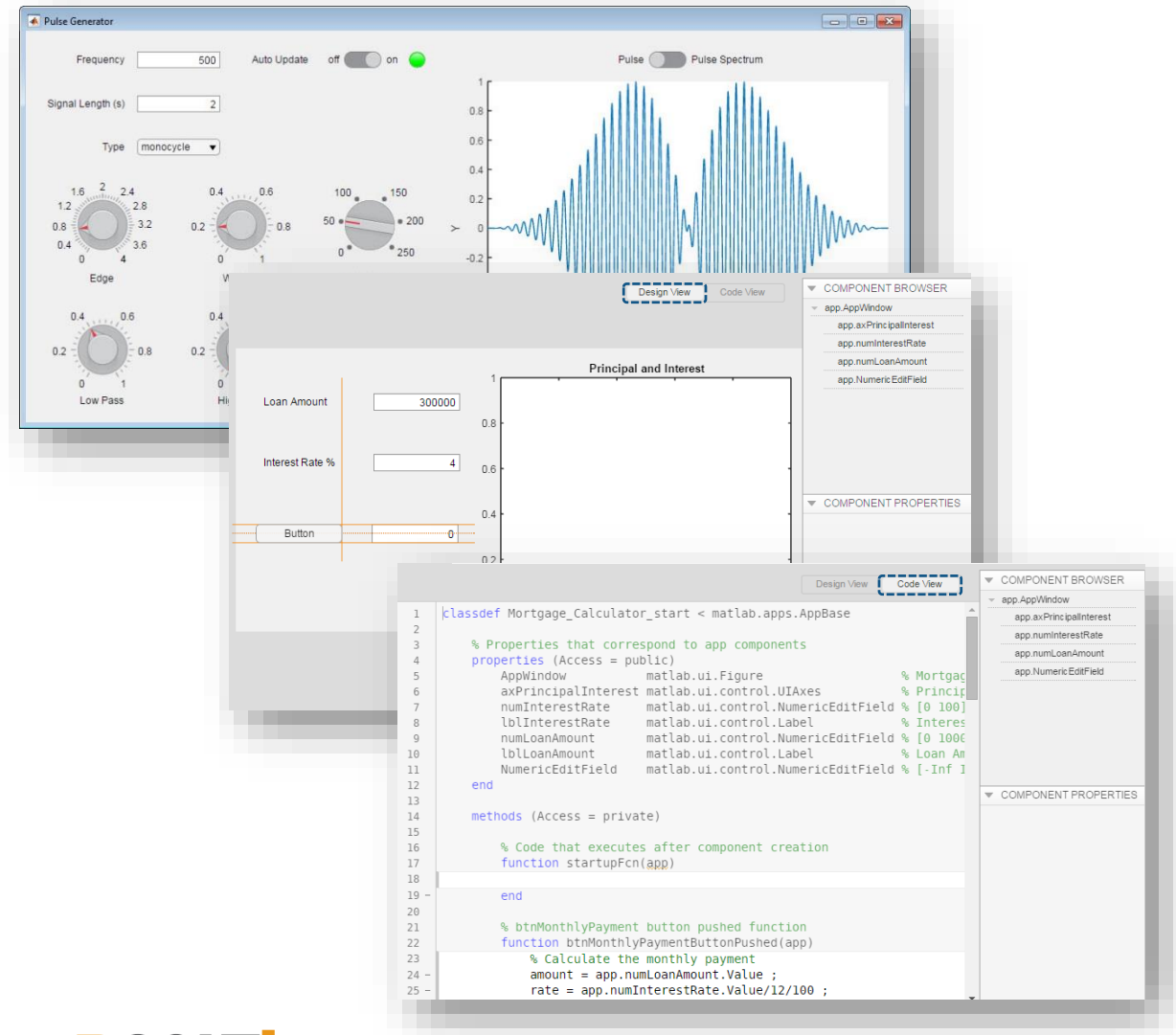
Intuitive data processing

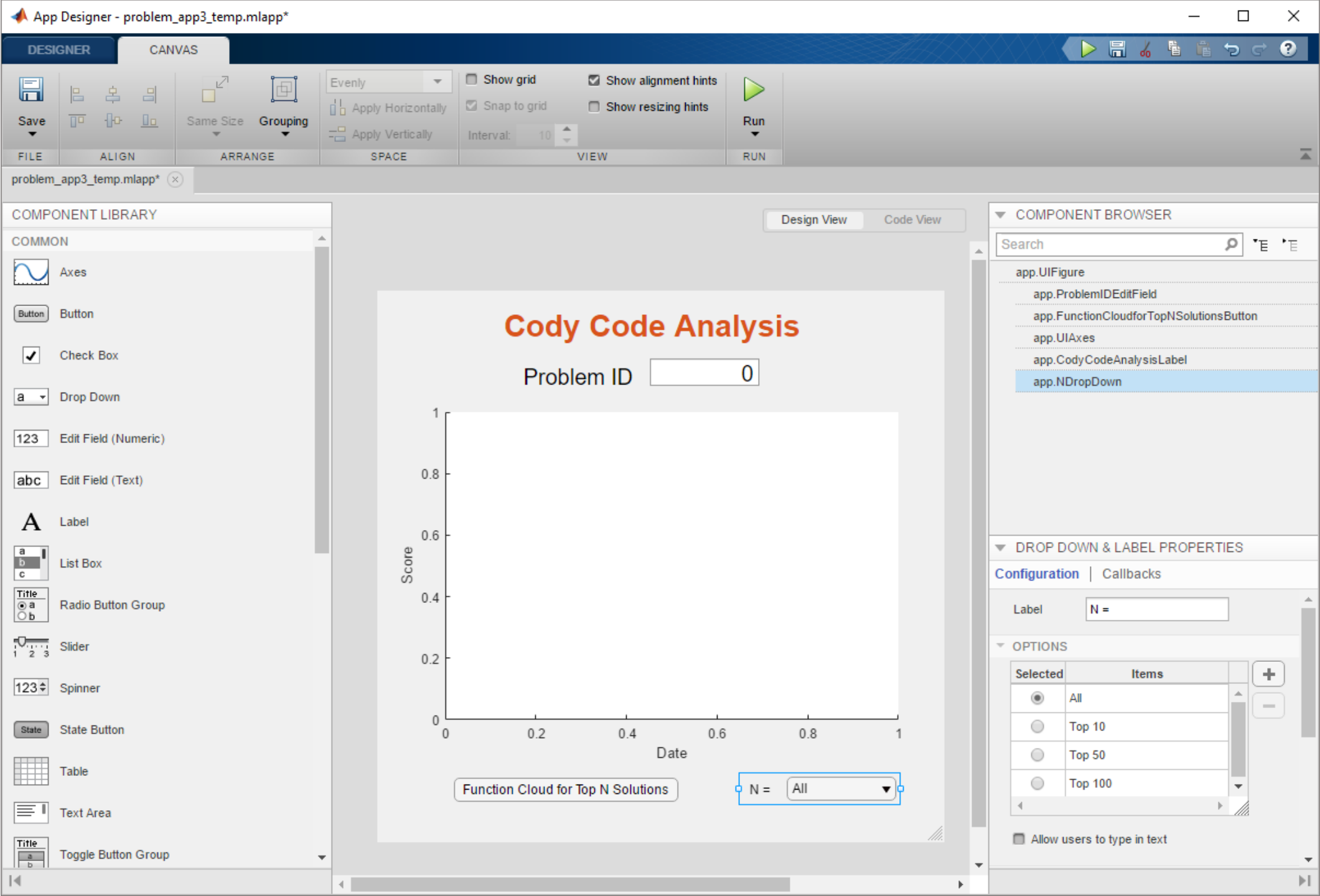
- Detect local minima and maxima **R2017b** using `islocalmin` and `islocalmax`
- Detect abrupt changes in data with `ischange` **R2017b**

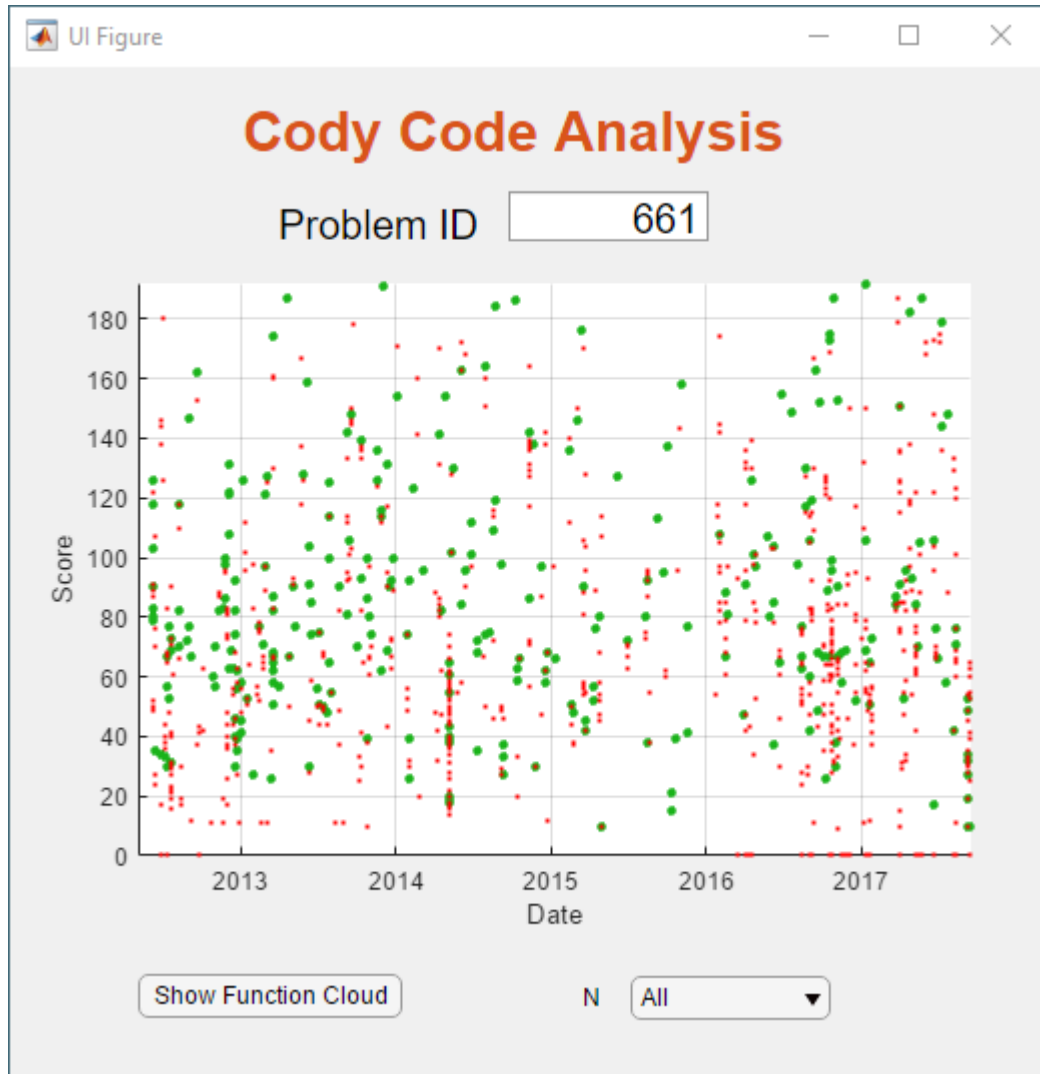


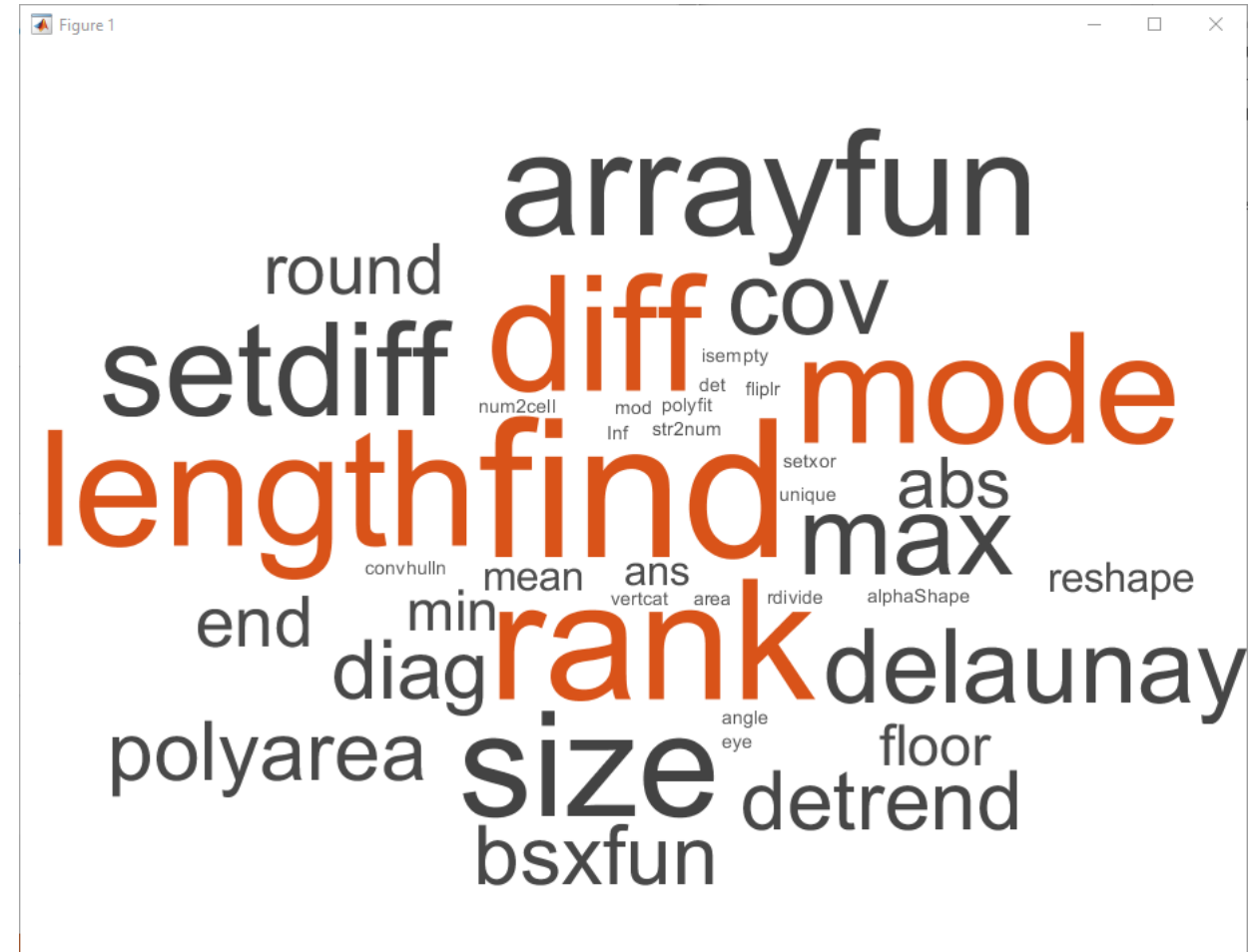
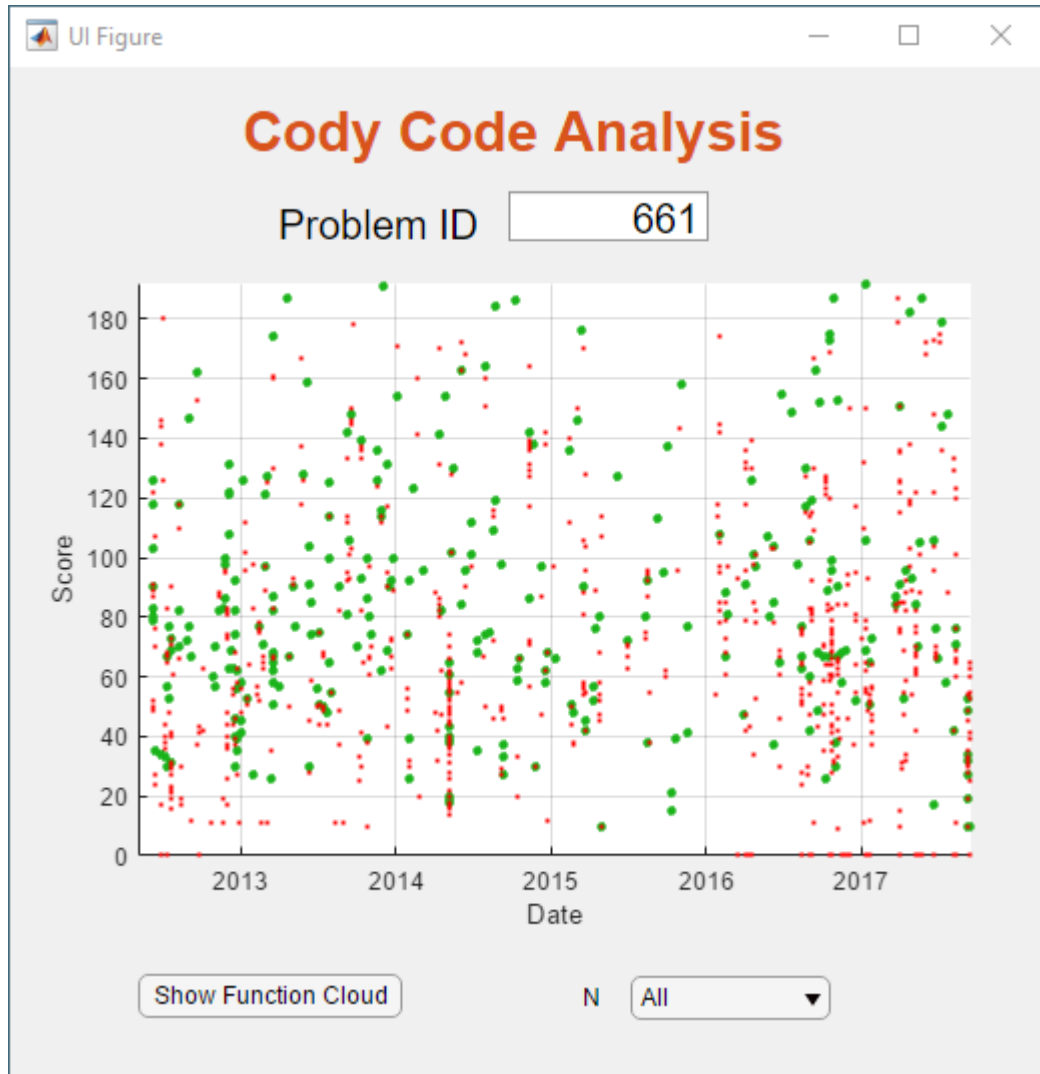
App Designer

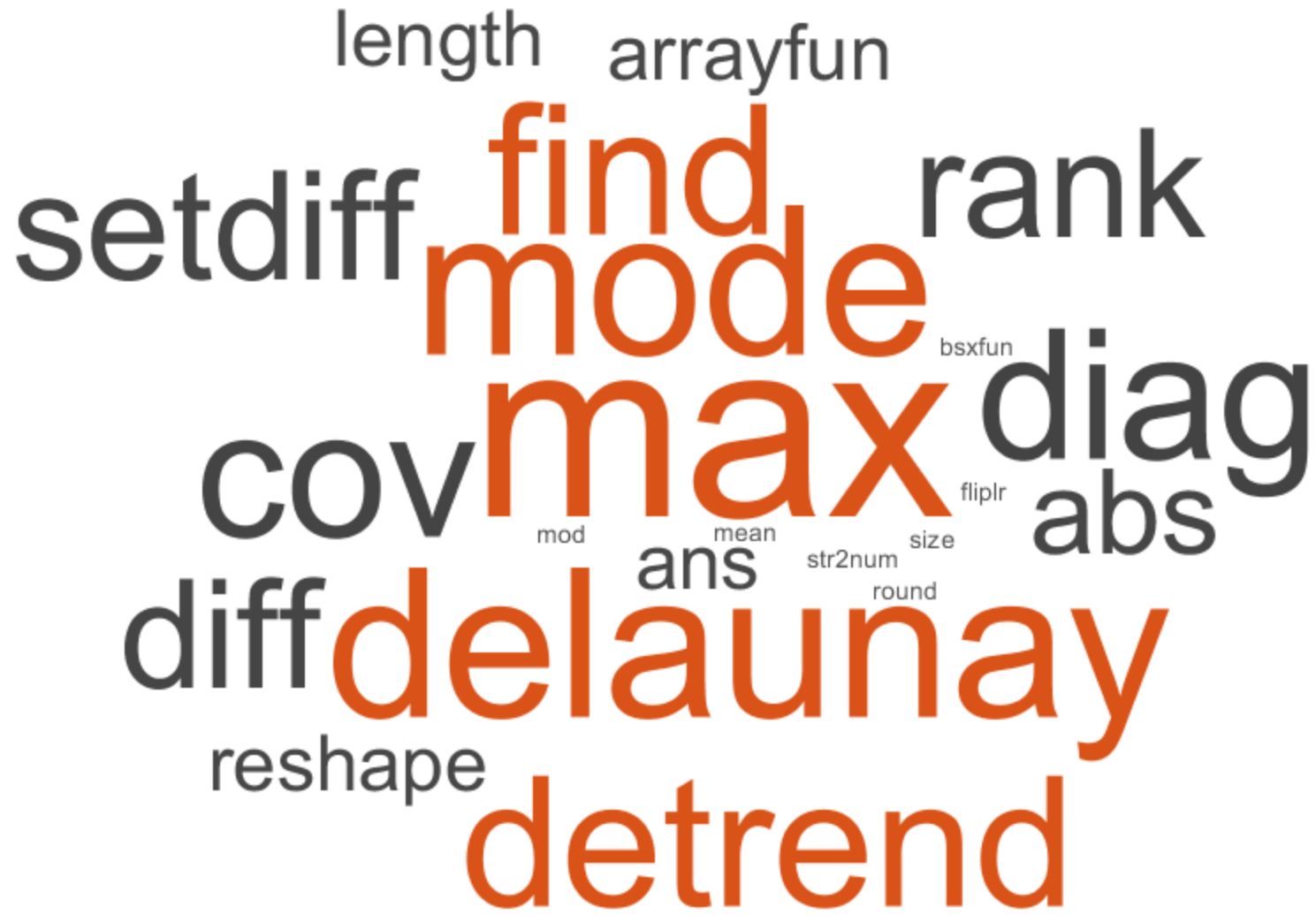
- Enhanced design environment
 - Component alignment guides
 - Simpler property inspectors
 - Intuitive menu bar interface **R2017b**
- Expanded UI component set
 - Gauges, dials, tabbed interfaces, and more...
- Improved code and coding tools
 - Object-based code format
 - Property and method management
 - Code refactoring
- Run App Designer apps in MATLAB Online **R2017b**











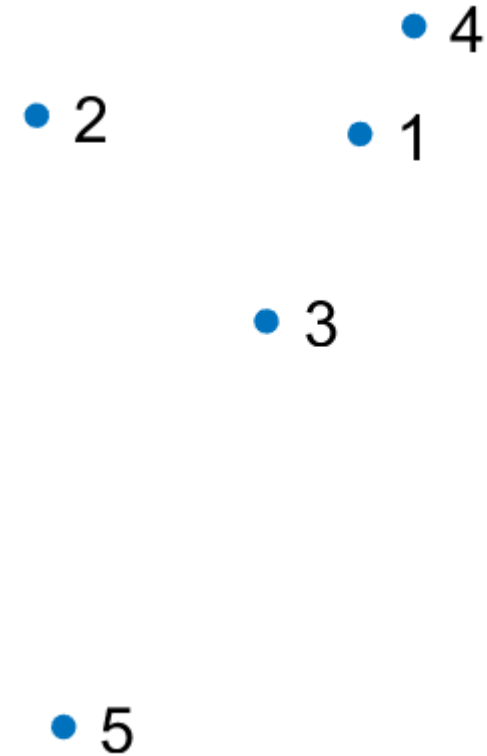
mode
del^{str2num}launay
resh^{mod}ape^{flipr}
find

Spot the Outlier

Cody Problem 661.

Which point is not on the line?

```
pts = [ 0.43    0.85  
       -1.77   0.98  
       -0.21  -0.42  
        0.79   1.59  
       -1.59  -3.18 ]
```



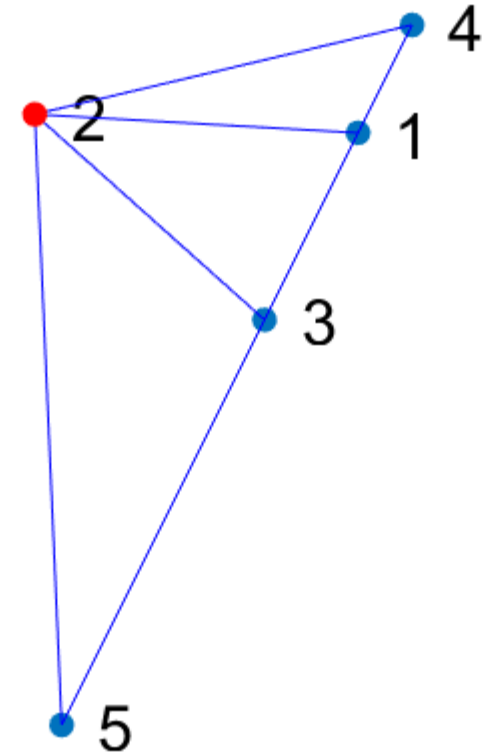
Spot the Outlier

Cody Problem 661.

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```
pts = [ 0.43    0.85  
       -1.77   0.98  
       -0.21  -0.42  
        0.79   1.59  
       -1.59  -3.18 ]
```

```
tri = delaunay(pts)
```



Spot the Outlier

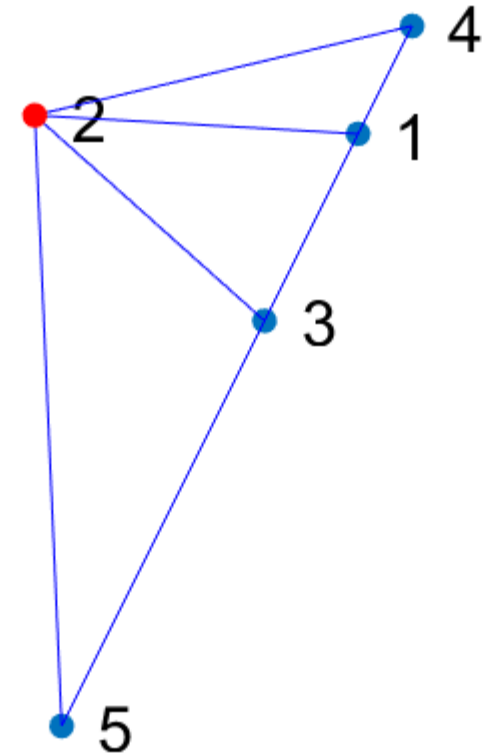
Cody Problem 661.

Which point is not on the line?

```
pts = [ 0.43    0.85  
        -1.77   0.98  
        -0.21  -0.42  
         0.79   1.59  
        -1.59  -3.18 ]
```

```
tri = delaunay(pts)
```

```
tri =  
     2     1     4  
     2     3     1  
     2     5     3
```



Spot the Outlier

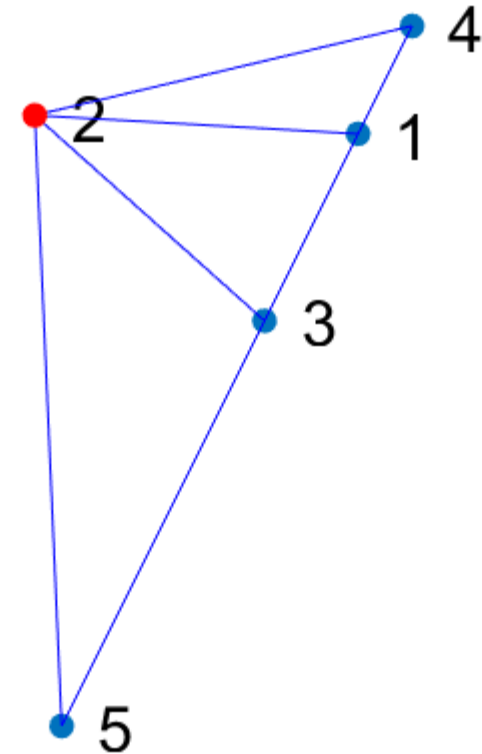
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        0.79    1.59  
       -1.59   -3.18 ]
```

```
tri = delaunay(pts)
```

```
tri =  
     2     1     4  
     2     3     1  
     2     5     3
```



Spot the Outlier

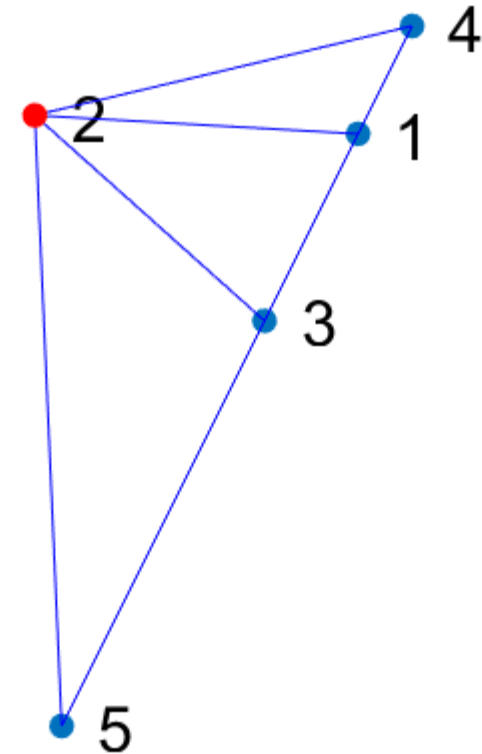
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Which point is not on the line?

```
pts = [ 0.43    0.85  
       -1.77    0.98  
       -0.21   -0.42  
        0.79    1.59  
       -1.59   -3.18 ]
```

```
tri = delaunay(pts)  
index = mode(tri(:))
```

```
tri =  
     2     1     4  
     2     3     1  
     2     5     3
```



```
mode(reshape(delaunay(pts),1,[]))
```

What's New

- Live Editor
- Tables (Tall Tables, TimeTables)
- Datastores
- Testing & Compatibility
- App Designer
- Text Analytics
- Data Analytics
- Machine Learning & Deep Learning

R2017a

R2017b

