

ENGG1811 Computing for Engineers

Week 10 (Wednesday) Vectorization Examples

Vectorization

Example – 1 : Find point distance from origin

```
>> m = [2,4; 1, 3; 5, 2]
```

```
m =
```

```
    2    4  
    1    3  
    5    2
```

```
>> m .^ 2
```

```
ans =
```

```
    4   16  
    1    9  
   25    4
```

```
>> sum(m .^ 2, 2)
```

```
ans =
```

```
   20  
   10  
   29
```

Vectorization

Example – 1 : Find point distance from origin

```
>> sum(m .^ 2, 2) .^ (1/2)
```

```
ans =
```

```
4.4721
```

```
3.1623
```

```
5.3852
```

```
>> min( sum(m .^ 2, 2) .^ (1/2))
```

```
ans =
```

```
3.1623
```

```
>> [val, pos] = min( sum(m .^ 2, 2) .^ (1/2))
```

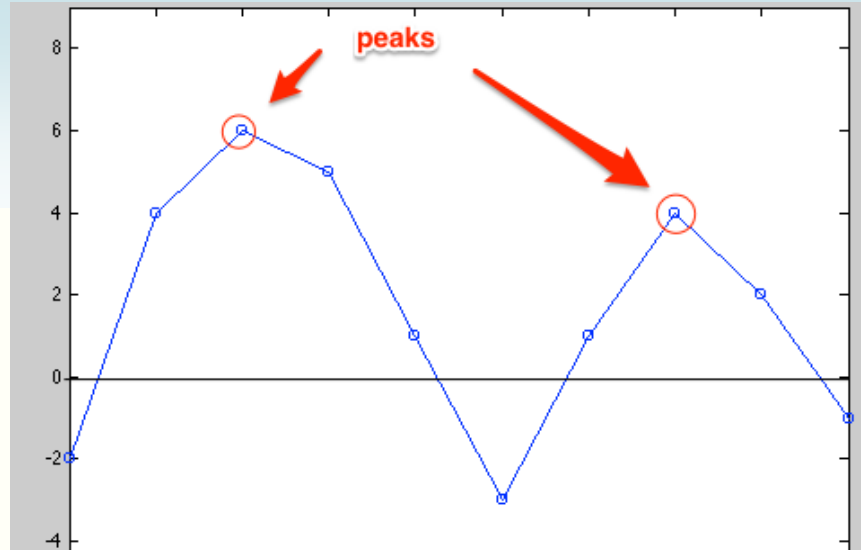
```
val =
```

```
3.1623
```

```
pos =
```

```
2
```

Vectorization Example – 2: Find Peaks



```
>> v = [-2, 4, 6, 5, 1, -3, 1, 4, 2, -1]
```

```
>> v(1:end-1)
```

```
ans = -2    4    6    5    1   -3    1    4    2
```

```
>> v(2:end)
```

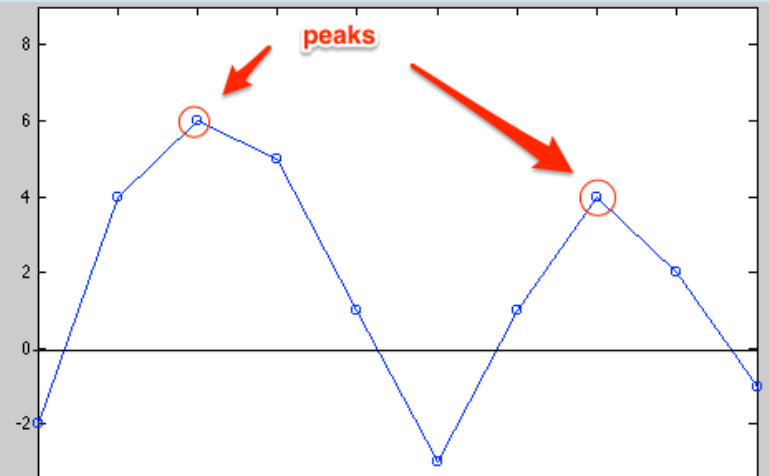
```
ans =  4    6    5    1   -3    1    4    2   -1
```

```
>> v(1:end-1) < v(2:end)
```

```
ans =  1    1    0    0    0    1    1    0    0
```

↑ ↑ ↑ ↑
 -2<4 4<6 6<5 5<1

Vectorization Example – 2: Find Peaks



```
>> v = [-2, 4, 6, 5, 1, -3, 1, 4, 2, -1]
```

```
>> v(1:end-2)
```

```
ans = -2 4 6 5 1 -3 1 4
```

```
>> v(2:end-1)
```

```
ans = 4 6 5 1 -3 1 4 2
```

```
>> v(3:end)
```

```
ans = 6 5 1 -3 1 4 2 -1
```

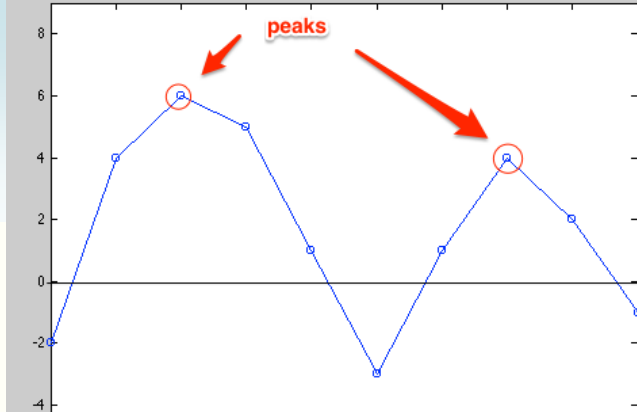
```
>> v(2:end-1) > v(1:end-2)
```

```
ans = 1 1 0 0 0 1 1 0
```

```
>> v(2:end-1) > v(3:end)
```

```
ans = 0 1 1 1 0 0 1 1
```

Vectorization Example – 2: Find Peaks



```
>> v = [-2, 4, 6, 5, 1, -3, 1, 4, 2, -1]
```

```
>> v(2:end-1) > v(1:end-2)
```

```
ans = 1 1 0 0 0 1 1 0
```

```
>> v(2:end-1) > v(3:end)
```

```
ans = 0 1 1 1 0 0 1 1
```

```
>> peaks = (v(2:end-1) > v(1:end-2)) & (v(2:end-1) > v(3:end))
```

```
peaks = 0 1 0 0 0 0 1 0
```

```
>> sum(peaks)
```

```
ans = 2
```

← Number of peaks in **v**

```
>> find( peaks > 0)
```

```
ans = 2 7
```

← Positions of peaks in **v(2:end-1)**

```
>> find( peaks > 0) + 1
```

```
ans = 3 8
```

← Positions of peaks in **v**