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
```
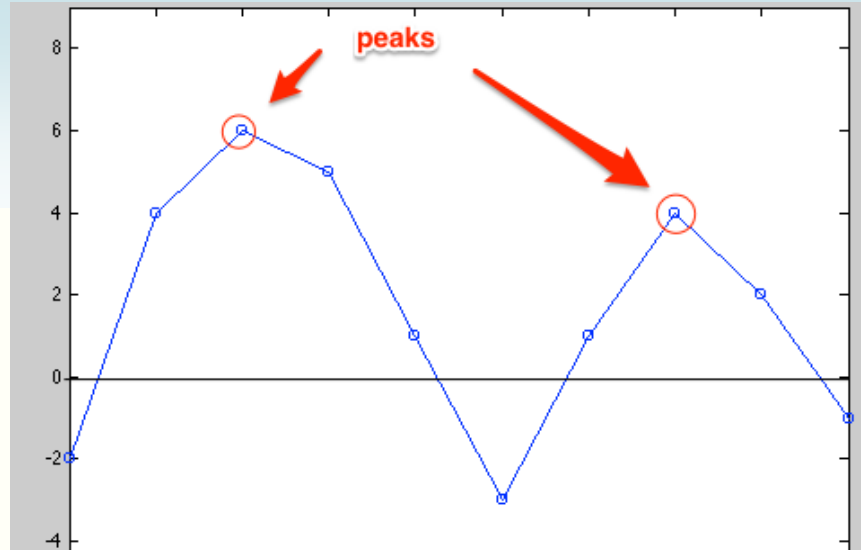
Vectorization Example – 2: Find Peaks


```
>> 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
```
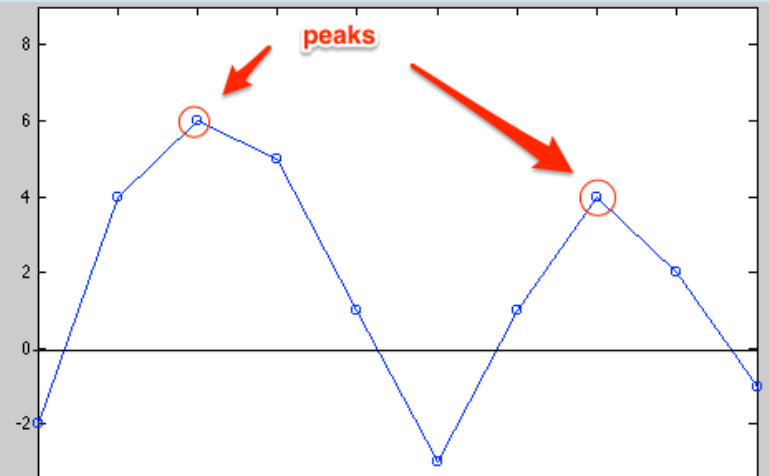
-2<4   4<6   6<5   5<1   ... ...

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
```
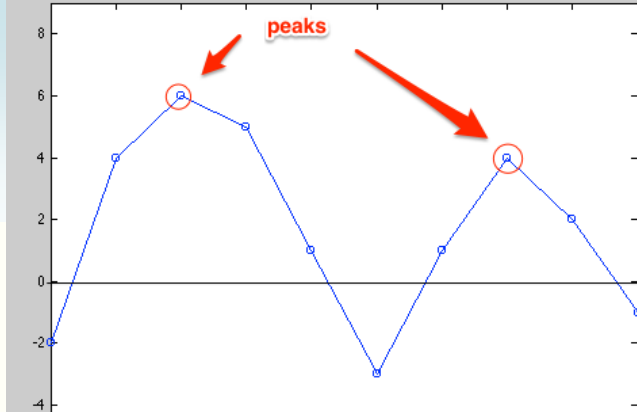
Vectorization Example – 2: Find Peaks


```
>> 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
```