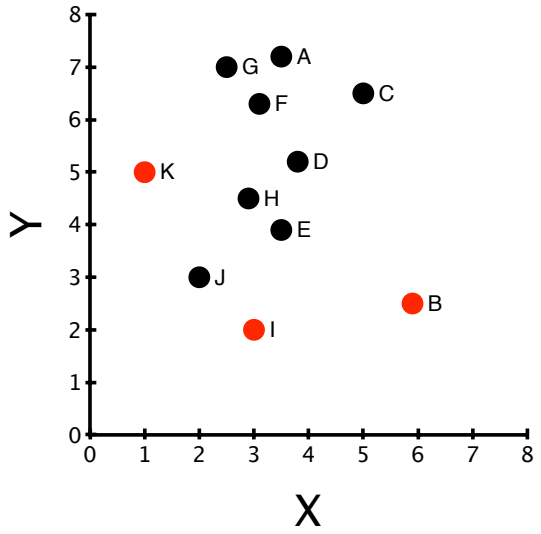
Tools & Models for Data Science
Outliers Handout

```
init min-priority queue O
for x_1 ∈ X:
  init max-priority queue Q
  for x_2 ≠ x_1 ∈ X:
    insert dist(x_1, x_2) into Q
    if |Q| > k
      remove max from Q
  insert x_1 into O with key max(Q)
  if |O| > m
    remove point with min key from O

return O
```



Point	2NN distance
A	1.02
B	2.94
C	1.77
D	1.30
E	1.33
F	0.98
G	1.02
H	1.14
I	1.96
J	1.75
K	2.24

```
O: { }
Pick a point: A
Q: { }
        Pick a point: B
        Q: {5.28}
        Q is not full

        Pick a point: C
        Q: {1.66, 5.28}
        Q is not full

        Pick a point: D
        Q: {1.66, 2.02, 5.28}
        Q is full
        Q: {1.66, 2.02}

        Pick a point: E
        Q: {1.66, 2.02, 3.30}
        Q is full
        Q: {1.66, 2.02}
        ...
        Q: {0.98, 1.02}

O: {(1.02, A)}
O is not full

Next point: B
Q: { }
        Pick a point: A
        Q: {5.28}
        Q is not full

        Pick a point: C
        Q: {4.1, 5.28}
        Q is not full

        Pick a point: D
        Q: {1.77, 4.1, 5.28}
        Q is full
        Q: {1.77, 4.1}

        ...

        Q: {2.78, 2.94}
O: {(1.02, A), (2.94, B)}

Finally, get
O: {(2.94, B), (2.24, K), (1.96, I)}
```

