Nearest Neighbor using KD Trees
Nearest Neighbor

- K-nearest neighbor is a simple classifier
- But it’s slow!
Nearest Neighbor

• K-nearest neighbor is a simple classifier

• But it’s slow!

• How many comparisons would we need to make to find the nearest neighbor for the purple point?
Accelerating NN

• What if we could use the results of earlier comparisons to avoid doing later comparisons?

• If we already found a pretty close neighbor, an we skip looking at far away points?

• How can we do this without already known which points are “far away”?

• Idea: precompute some spatial information
KDTrees

- A *spatial acceleration structure*
- One of many such trees: octtrees, ball trees, BSP trees
- Hierarchical breakdown of space.
KDTrees
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Using a KDTree
Find closest leaf
Find closest leaf
Initial guess for NN
Search rest of tree
Search rest of tree
Search rest of tree
Search rest of tree
Search rest of tree

Diagram of a tree with nodes labeled A, B, C, D, E, F, G, H, I.