Optimal Classification

A. Two Steps

Optimal Classification

A. Two Steps
    1. Calculate the optimal cutting plane for each vote.

Optimal Classification

A. Two Steps
   1. Calculate the optimal cutting plane for each vote.
      a. **cut plane (defined)**: a plane that separates the yea voters on one side from the nay voters on the other side.

Optimal Classification

A. Two Steps
   1. Calculate the optimal cutting plane for each vote.
      a. **cut plane (defined)**: a plane that separates the yea voters on one side from the nay voters on the other side.
   2. Optimally classify each voter in the regions created in step 1.

Optimal Classification

B. Assumptions:

Optimal Classification

B. Assumptions:

1. Voters have single peaked and symmetric preferences.

Optimal Classification

B. Assumptions:

1. Voters have single peaked and symmetric preferences.
2. Voting is sincere.

Optimal Classification

B. Assumptions:

1. Voters have single peaked and symmetric preferences.
2. Voting is sincere.
3. For this demonstration, there are two dimensions.

Step 1: Calculate the optimal cut plane for each vote.

1. cut plane (defined): a plane that separates the yea voters on one side from the nay voters on the other side.

Step 1: Calculate the optimal cut plane for each vote.

1. cut plane (defined): a plane that separates the yea voters on one side from the nay voters on the other side.
2. **Projection line (defined):** the line perpendicular to the cut line that runs through the center of the unit circle.

Step 1: Calculate the optimal cut plane for each vote.

1. cut plane (defined): a plane that separates the yea voters on one side from the nay voters on the other side.
2. **Projection line (defined):** the line perpendicular to the cut line that runs through the center of the unit circle.

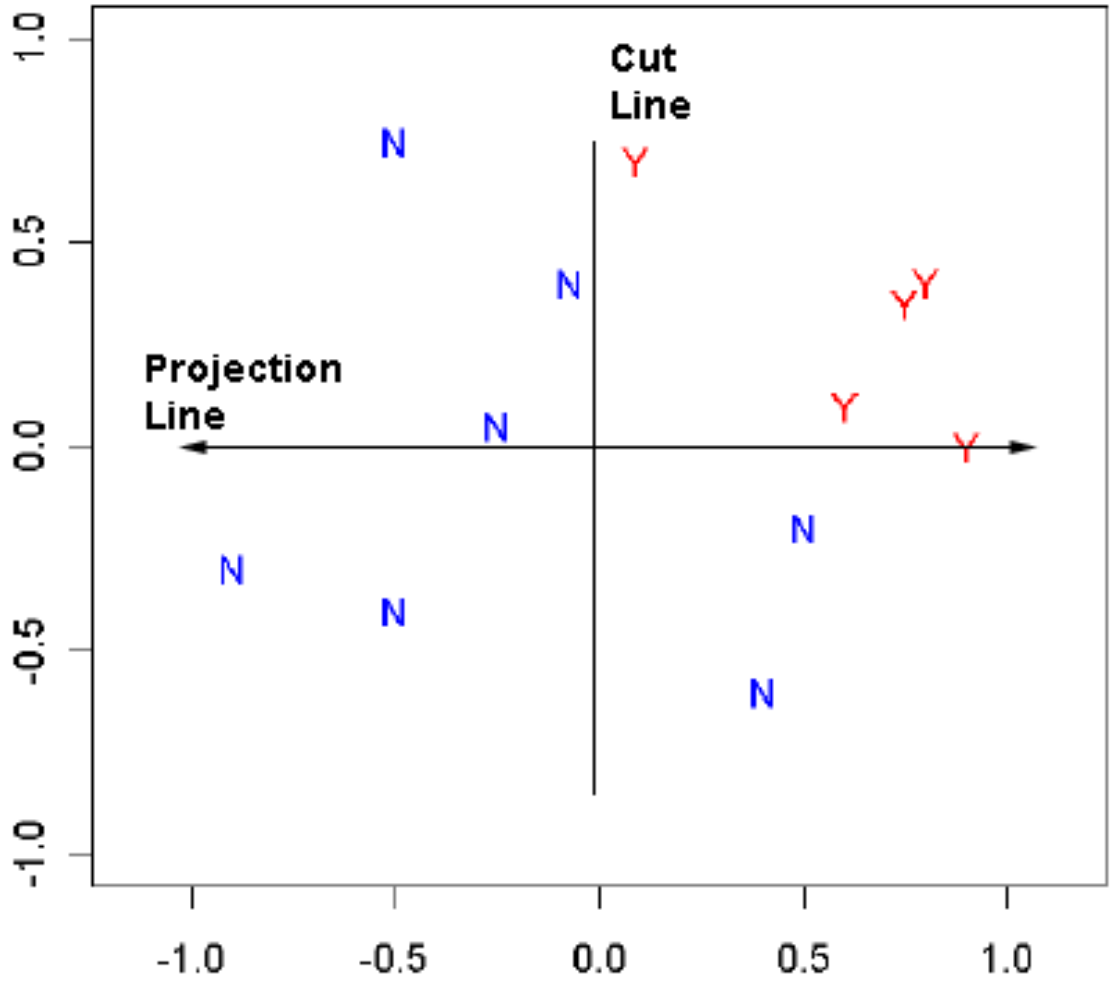
   In this demonstration there will be 12 voters and 5 votes.

Step 1: Calculate the optimal cut plane for each vote.

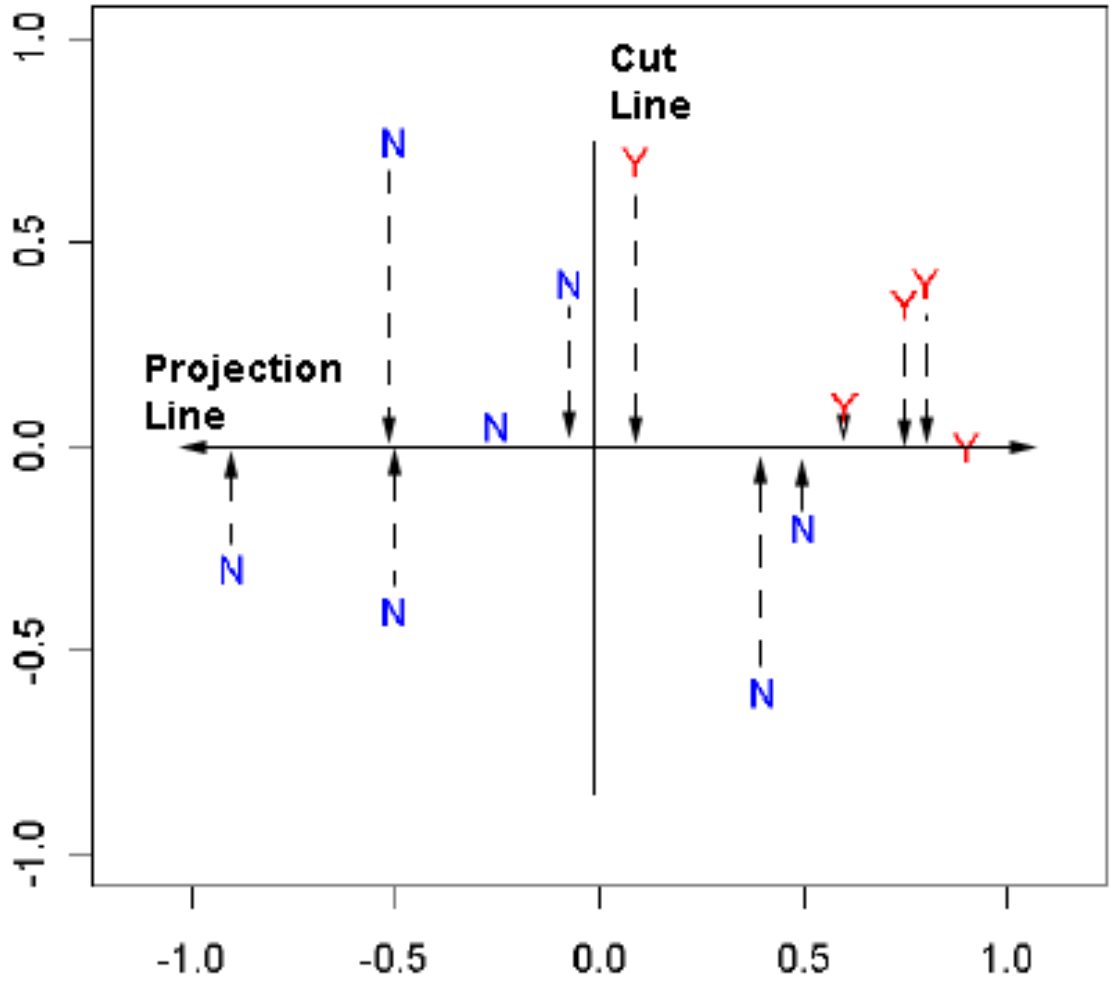
1. cut plane (defined): a plane that separates the yea voters on one side from the nay voters on the other side.
2. **Projection line (defined):** the line perpendicular to the cut line that runs through the center of the unit circle.

   In this demonstration there will be 12 voters and 5 votes. We start with vote 1, a single vote.

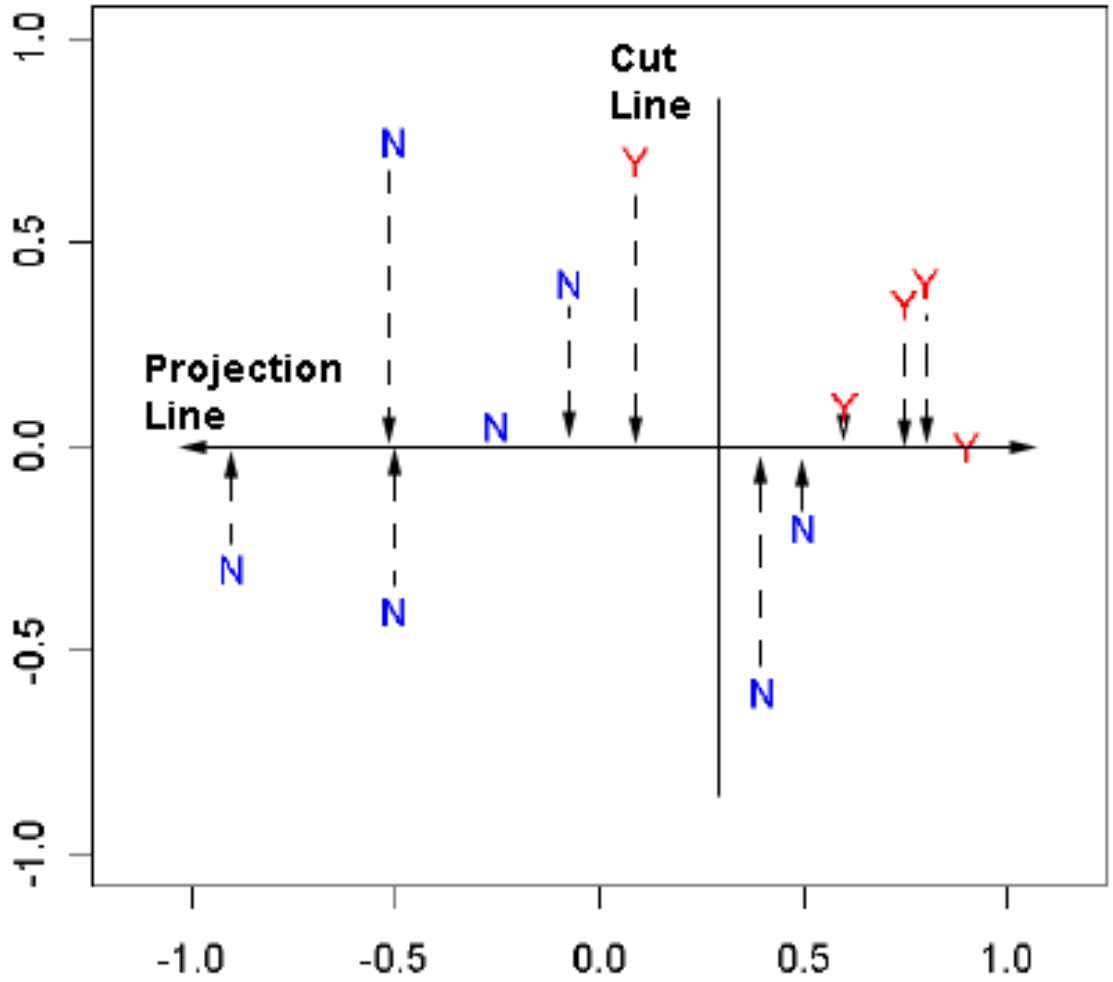
Step 1: Calculate the optimal cut plane for each vote.



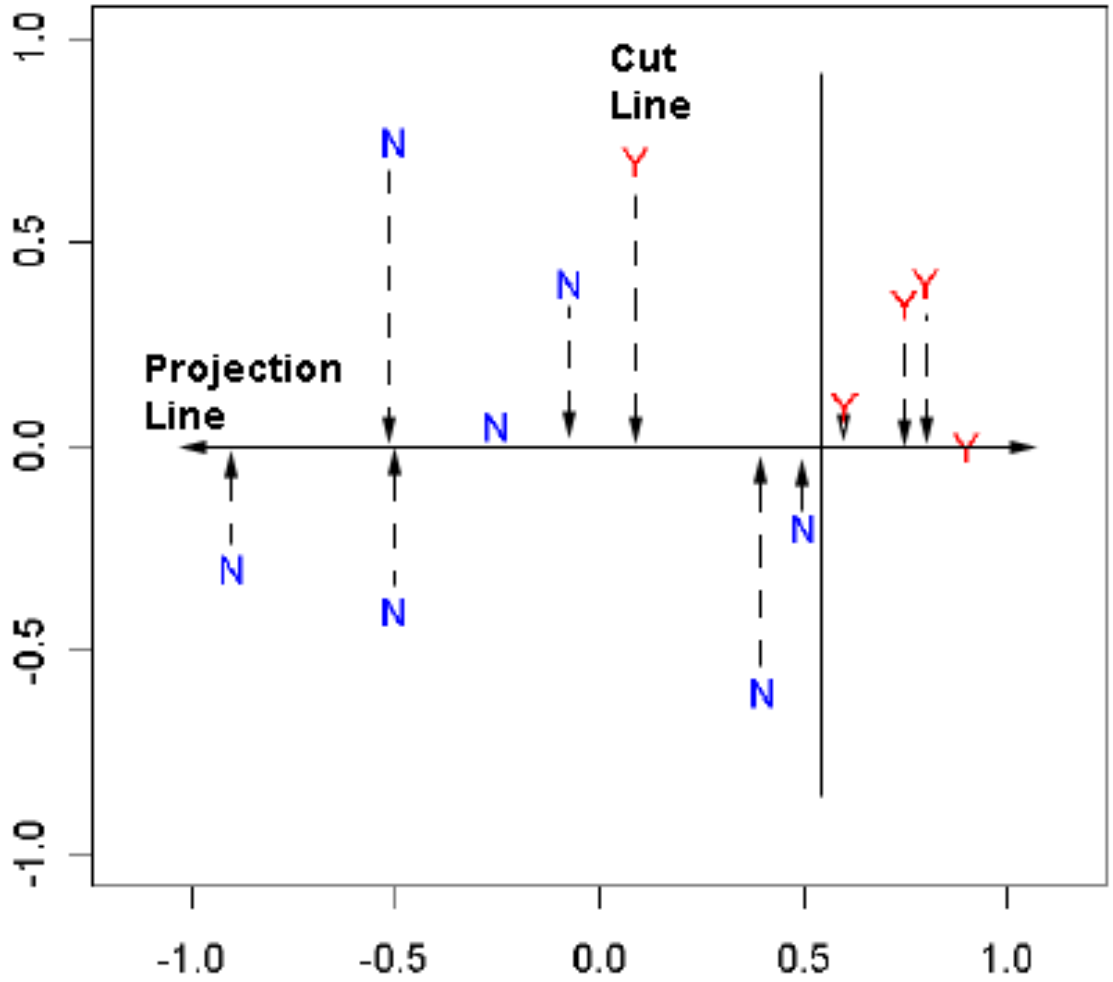
Step 1: Calculate the optimal cut plane for each vote.



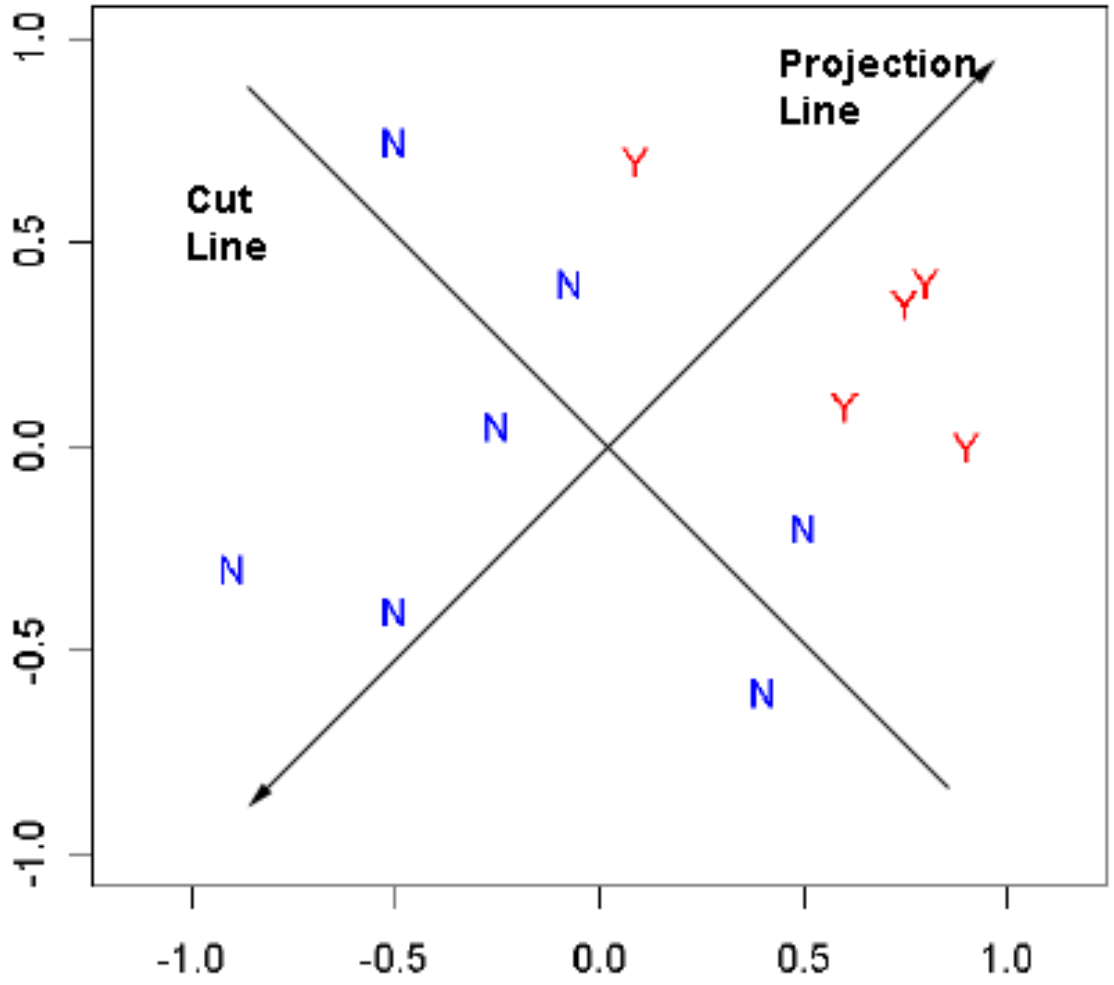
Step 1: Calculate the optimal cut plane for each vote.



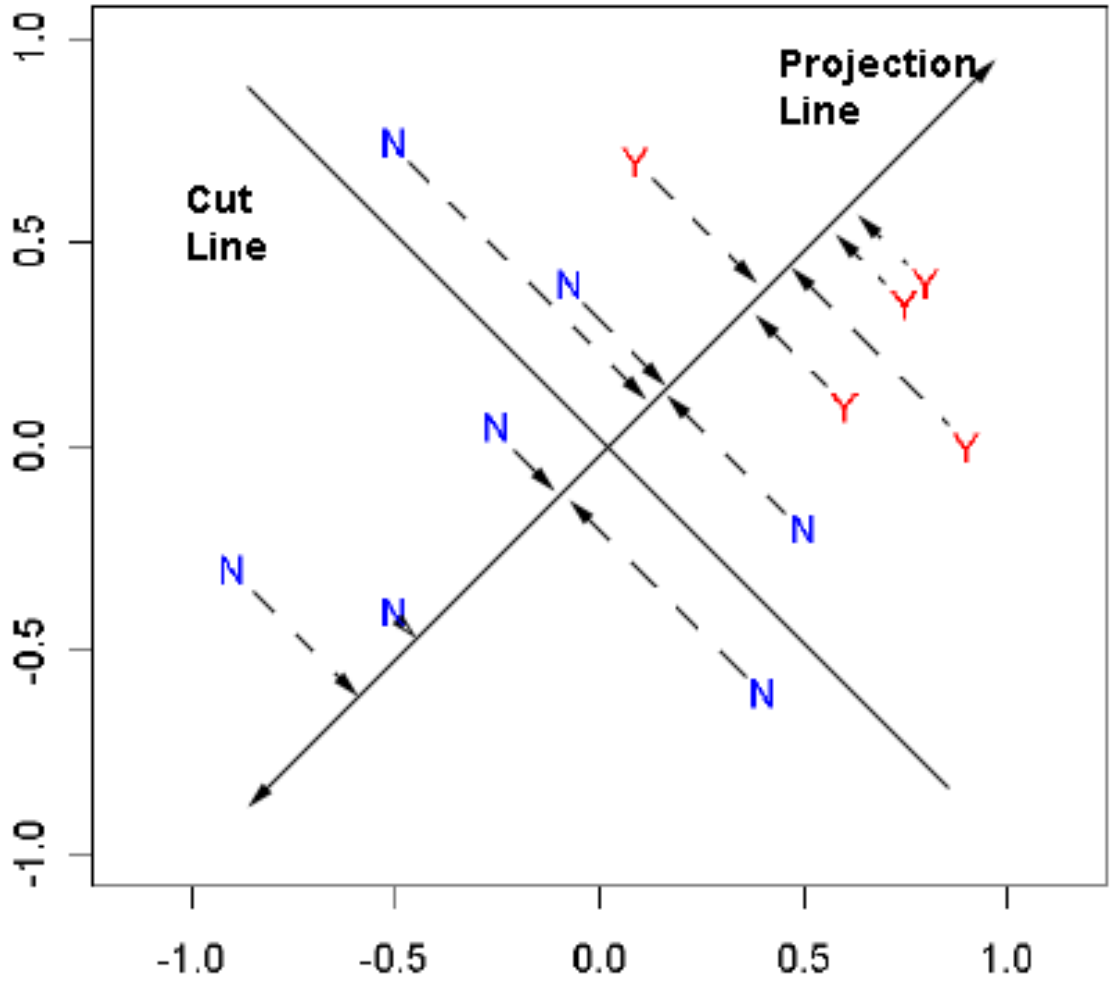
Step 1: Calculate the optimal cut plane for each vote.



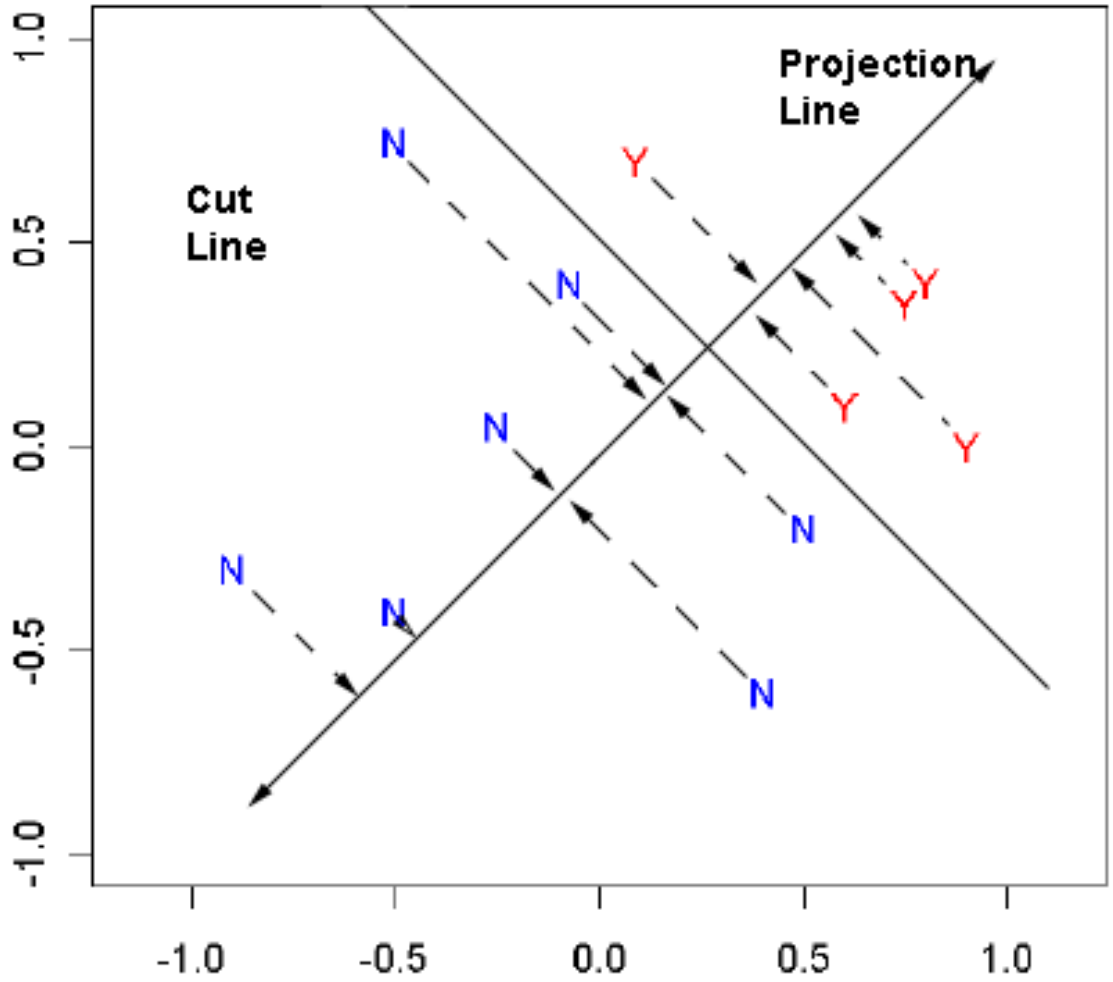
Step 1: Calculate the optimal cut plane for each vote.



Step 1: Calculate the optimal cut plane for each vote.

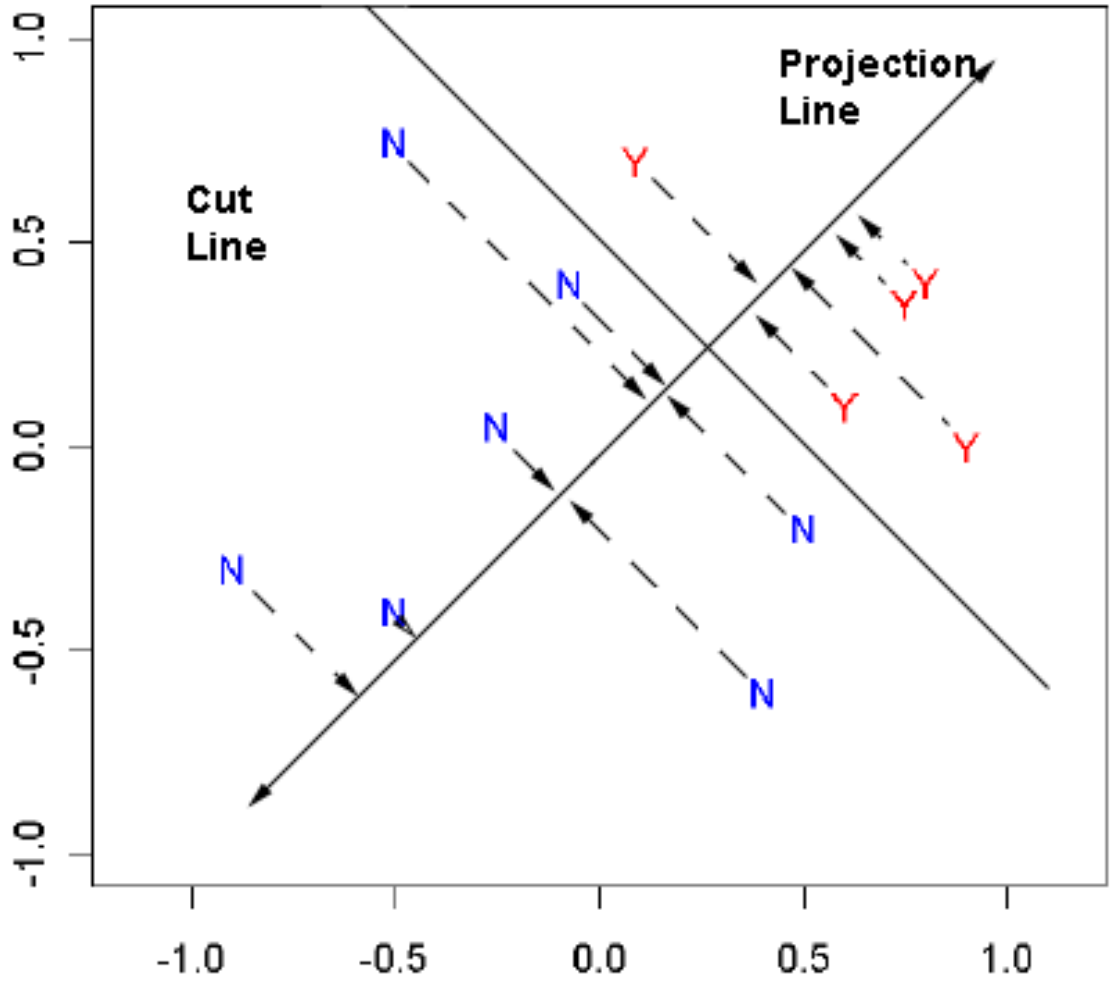


Step 1: Calculate the optimal cut plane for each vote.

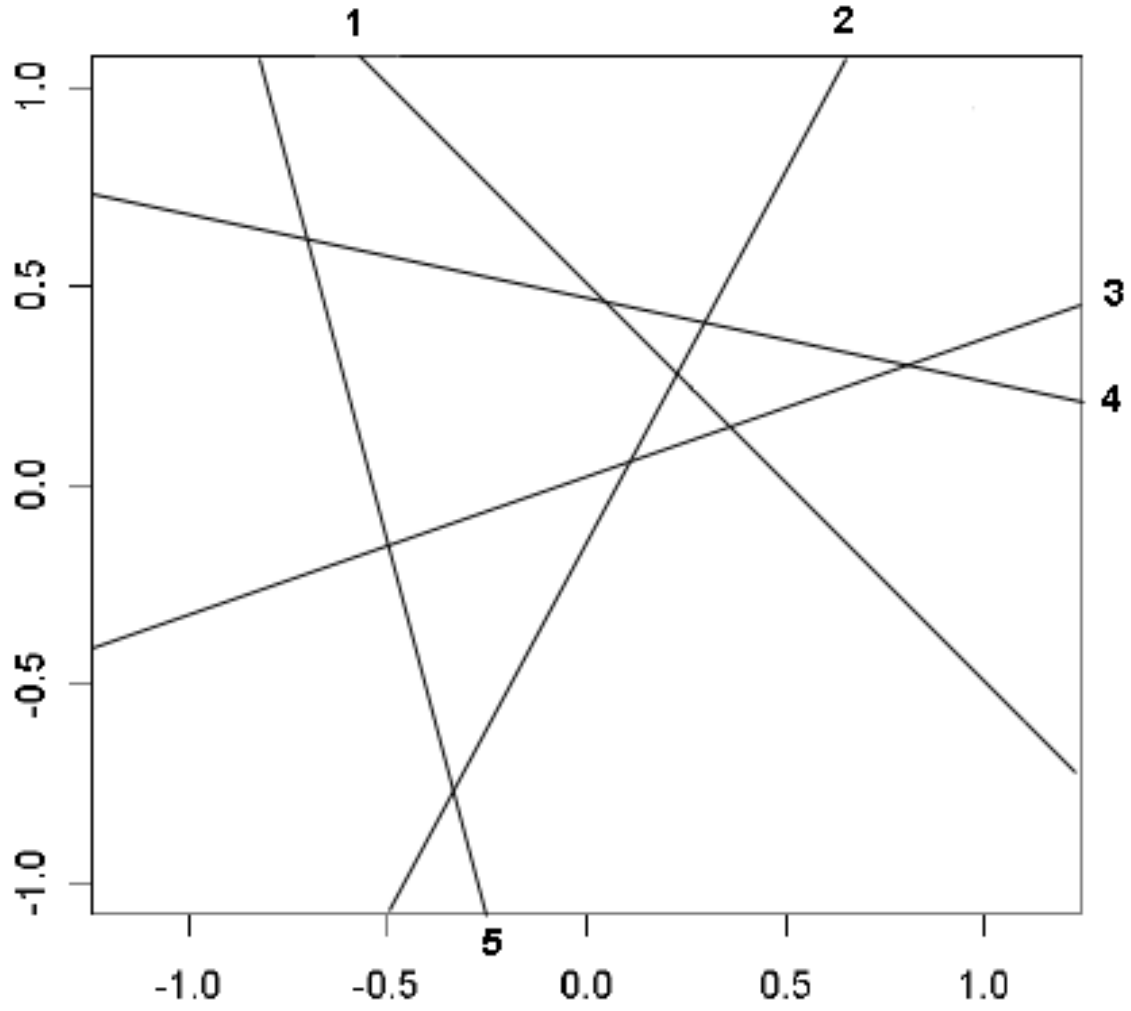


Step 1: Calculate the optimal cut plane for each vote.

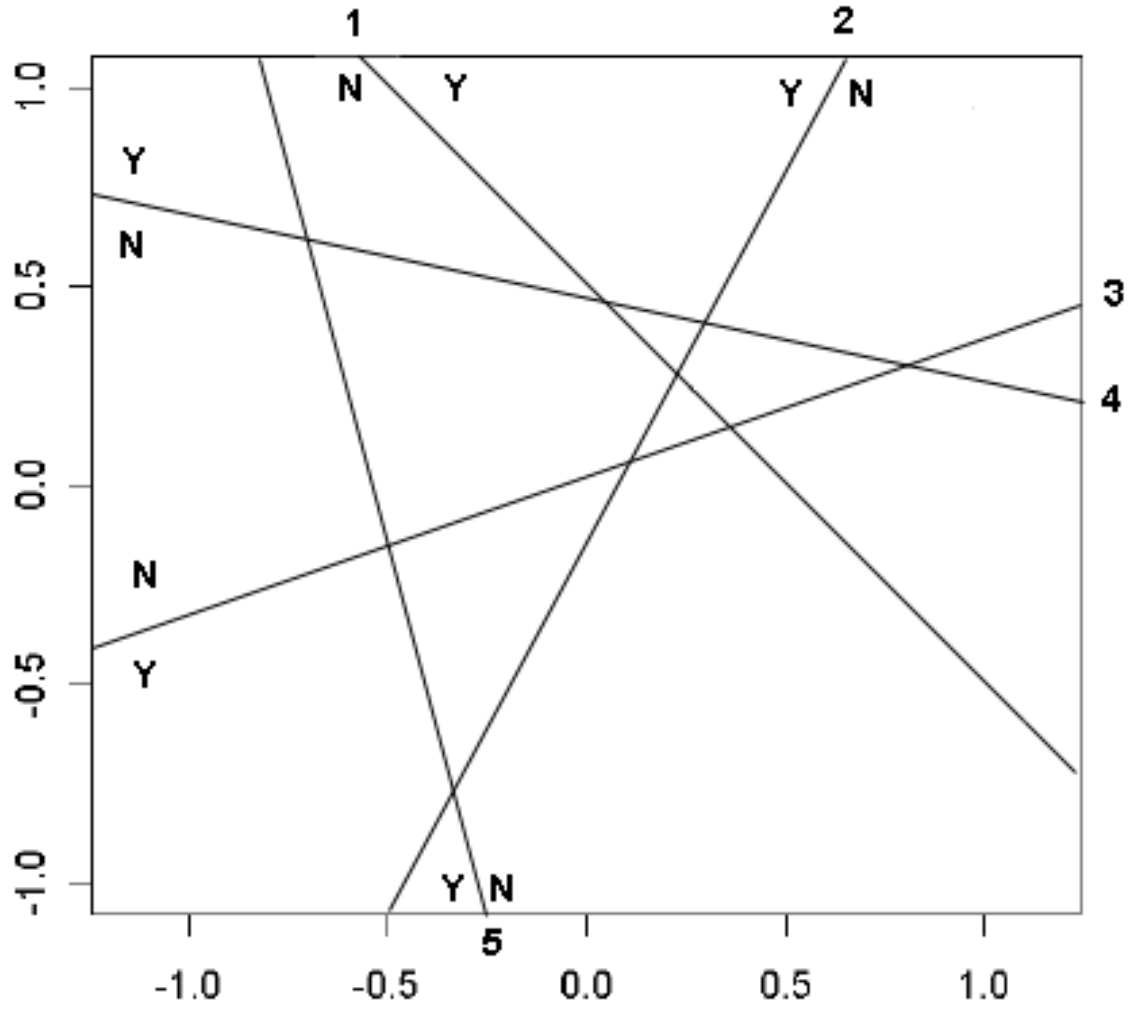
Aha! The optimal cut line.



Step 2: Optimally classify each voter.

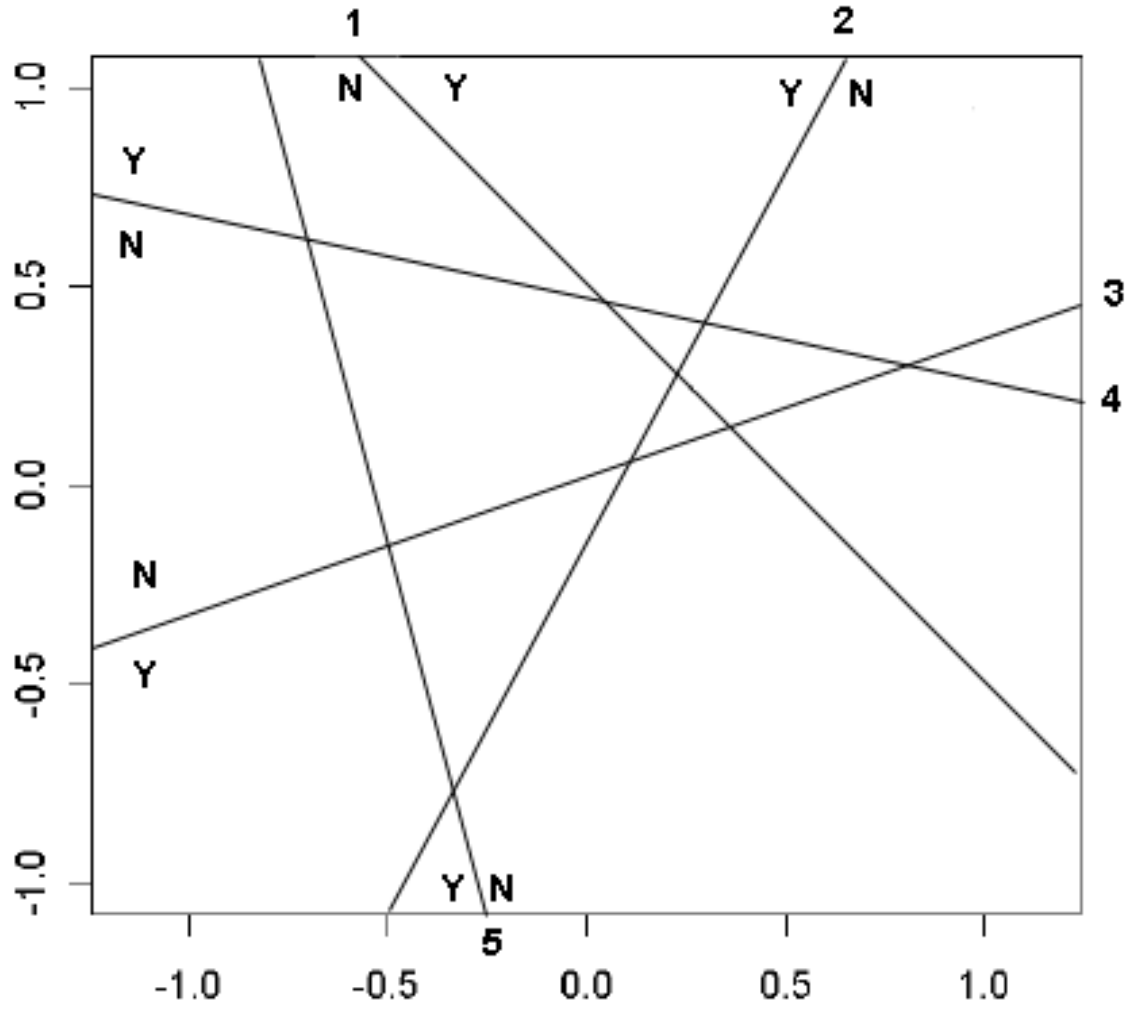


Step 2: Optimally classify each voter.



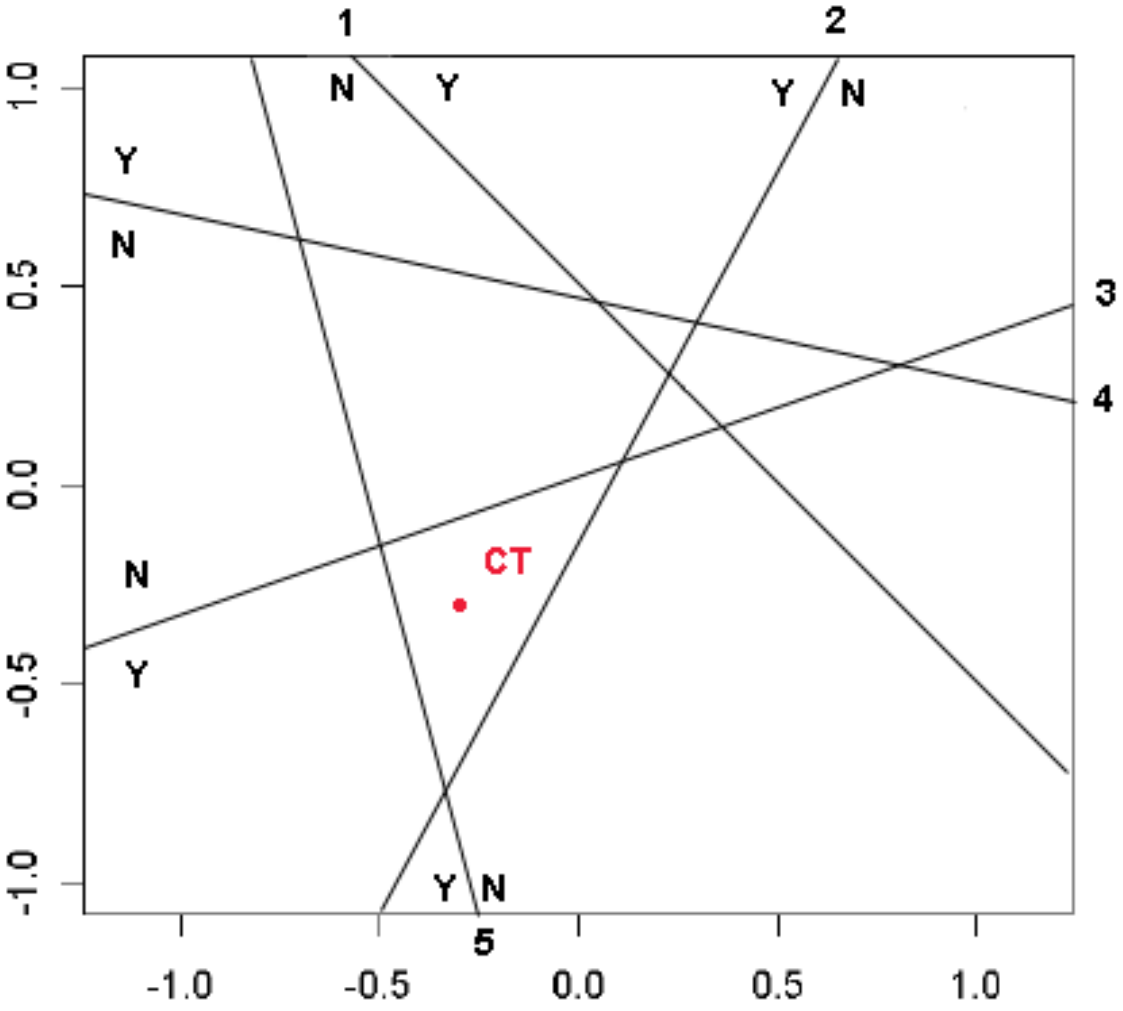
Step 2: Optimally classify each voter.

Suppose CT voted NYYNN



Step 2: Optimally classify each voter.

Suppose CT voted NYYNN, then CT would be here. →



Optimal Classification

D. Notes

1. Steps 1&2 are then repeated until classification cannot improve.

Optimal Classification

D. Notes

1. Steps 1&2 are then repeated until classification cannot improve.
2. For 569 votes, there is a maximum of 162,166 classification regions in two dimensions.

Optimal Classification

D. Notes

1. Steps 1&2 are then repeated until classification cannot improve.
2. For 569 votes, there is a maximum of 162,166 classification regions in two dimensions. On average, these regions are very small.