Lecture Notes: Borda Count & Copeland's Method

Math F113X

Review of **Voting Methods** so far

1. **Plurality Voting** ← person with the most votes wins

positives

- Easy!
- Quick!

negatives

- Winner may have a small minority of votes
- Can fail to choose the Condorcet Winner

* May not with every head-to-head race

2. **Instant Runoff Voting** (IRV), a.k.a. **Ranked Choice Voting** (RCV) ← Look for majority winner. If none, eliminate least-favored candidate and try again.

positives

- Winner preferred by a majority!

negatives

- Can fail to pick Condorcet winner
- fails monotonicity criterion
- takes longer!

Borda Count

Method:

Assign points to each choice

- Last place gets 1 point
- 2nd-to-last place gets 2 points

and so on...

Add up the points according to voter preference

Voter with the most points wins

Borda Count

pts	# votes	3	4	2	1	1
4	1st choice	A	B	C	C	D
3	2nd choice	C	C	D	B	C
2	3rd choice	B	D	B	A	B
1	4th choice	D	A	A	D	A

Plurality:

A	B	C	D
3	4	3	1

A: $4(3) + 1(4) + 1(2) + 2(1) + 1(1) = 12 + 4 + 2 + 2 + 1 = 21$

B: $2(3) + 4(4) + 2(2) + 3(1) + 2(1) = 31$

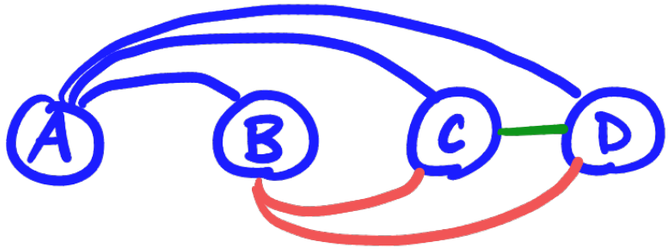
C: $3(3) + 3(4) + 4(2) + 4(1) + 3(1) = \boxed{36}$ ← C is Borda Count winner!

D: $1(3) + 2(4) + 3(2) + 1(1) + 4(1) = 22$

* Can fail majority condition

Copeland's Method

- Do all head-to-head matchups
- Assign one point per win, ½ point per tie
- Add up the points
- Candidate with the most points wins



Total matchups = 6 = $\frac{(4)(3)}{2}$ ← order doesn't matter

A vs B same as B vs A

17 candidates? # matchups = $\frac{17 \cdot 16}{2} = 136$

5 candidates?

matchups = $\frac{(5)(4)}{2} = 10$

AB AC AD AE BC
BD BE CD CE DE

Copeland's Method

# votes	3	4	2	1	1
1st choice	A	B	C	C	D
2nd choice	C	C	D	B	C
3rd choice	B	D	B	A	B
4th choice	D	A	A	D	A

tally A vs B

A	3	3
B	4 + 2 + 1 + 1	8

preference

3	4	2	1	1
A	B	B	B	B
B	A	A	A	A

matchup	A vs B	A vs C	A vs D	B vs C	B vs D	C vs D
tally	A : 3 B : 8	A : 3 C : 8	A : 4 D : 7	B : 4 C : 7	B : 8 D : 3	C : 10 D : 1
winner	B	C	D	C	B	C

Point Sum: A = 0, B = 2, C = 3, D = 1 ← C wins!