

Def.: An Condorcet method returns

a Condorcet winner (i.e., a candidate that wins all pairwise comparisons to other candidates) if one exists, and some candidate, otherwise.

Schulze Method

Notation: $d(X, Y)$ = number of pairwise comparisons won by X over Y .

Def.: For candidates X and Y , there exists a path $X = C_1, C_2, \dots, C_n = Y$ of strength $\geq z$ if

- $d(C_i, C_{i+1}) > d(C_{i+1}, C_i)$ for all $i = 1, \dots, n-1$.
- $d(C_i, C_{i+1}) \geq z$ f.a. $i = 1, \dots, n-1$, and $d(C_i, C_{i+1}) = z$ for some $i = 1, \dots, n-1$.

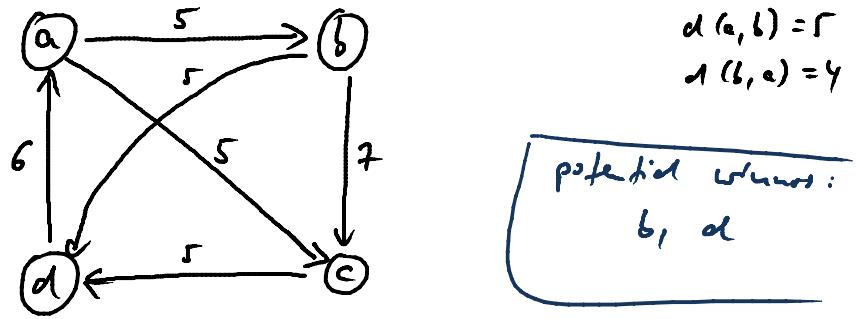
Def.: Let $\rho(X, Y)$ be the maximal value z such that there exists a path of strength $\geq z$ from X to Y , if such a path exists, and 0, otherwise.

Then the Schulze winner is the Condorcet winner, if it exists. Otherwise, a potential winner is a candidate a with $\rho(a, X) \geq \rho(X, a)$ f.a. $X \neq a$.

Tie-breaking to select pot. winner as Schulze winner.

# voters	3	2	2	2
1st	a	d	d	c
2nd	b	a	b	b
3rd	c	b	c	d
4th	d	c	a	a

Condorcet winner: a? no, loses to d.
b? no, loses to a. }
c? no, loses to b. }
d? no, loses to c. }
C. winner: d



$p(x, y)$:

	a	b	c	d
a	5	5	5	5
b	5	7	5	
c	5	5	5	5
d	5	5	5	

✓ ✓