CS-234
Technologies for Democratic society

Fall 2022

Week 5

Election methods — Social Choice

Purpose/goal: aggregate collective "will"

Reasons: - collectively approve/disapprove proposal
  is majority in favor of <u>yes or no</u>?
- elect single leader to office
- elect multiple representatives to body
- ...

How? What properties are desirable?

- How are preferences expressed?
  - yes/no?
  - choose 1 of n choices? or k out on n?
  - choose any subset of n choices — approval voting
  - rank set of n choices B>A>C
  - scoring: A 5 B 6 C 3 ⟵

- How are votes counted or aggregated?

- How is overall election run? Quality
  - transparency — so people trust outcome
  - anonymity/privacy — express true preferences w/o pressure
  - fair: 1 person, 1 vote
  - inclusive: "everyone" should be able to participate

Common single-winner election methods

- 2 candidates: majority vote >50%   A: 5   50%
- 3 or more: FPTP - plurality - highest wins   B: 3   30%
  runoff election (France)   C: $\frac{2}{10}$ 20%
  instant runoff voting (IRV)
      1. count all first-choice votes
      2. see if majority → yes, done
      3. eliminate candidate w/ least votes

Properties:
- completeness: always make a decision
-
-
-
-

"spoiler effect"

        35% 25%

A   B C

40% 60%

A>B>C   B>C>A
A>C>B   C>B>A

1st rank: ~~2~~ ~~3~~ 1.2
2st   : 1
3rd   : 0

"Bad case" for runoff or IRV

Left   center   right

A   B   C

40%   25%   35%

A>B>C   B>C>A 10%   C>B>A
           B>A>C 15%

- count via runoff or IRV:
  "biased" towards extremes.

- Condorcet rule
  - look at all possible
    2-candidate races

A vs B,	A vs C,	B vs C
40% 60%	35% 45%	65% 35%

Problem:
Condorcet cycle

Condorcet winner —> A: 1 wins
B: 2 wins
C: 0 wins

Other important systems:
Multi-winner:
- Single transferable vote (STV)

- party-list proportional representation (PR)

Single-winner:
- Approval voting