Introduction to the pandas library and *InstantRunoff.py*

Updated by Patrick Roche, B-term 2020

Ranked-choice voting fundamentals

To understand how this script works, one must first understand the theory behind a ranked-choice voting system. In a ranked-choice vote, voters assign each candidate on the ballot a ranked preference rating (1st choice, 2nd choice, etc.). If a candidate receives a majority of the first-place votes, then they win outright. However, if there is no first-place majority, then the lowest-ranked candidate is eliminated from consideration, and all their voters have their next-choice votes counted with the remaining first-place votes in a second round of consideration. This process repeats until a candidate secures a majority of first-place votes.

The APO ranked choice voting system has some additional rules beyond those foundational guidelines. Firstly, "No Confidence" must be a choice in all position elections. The *InstantRunoff.py* script treats no confidence votes exactly the same as votes for an actual candidate. APO ballots must also include an "*Abstain*" option. Abstain is not a valid winner of an election, and the script automatically removes it as a viable candidate for each count of first-choice votes. However, the bylaws state that any candidate must win by a majority where 50% + 1 of votes are non-abstaining. Thus, the script uses the Abstain votes each round to check that this constraint is met and ensure the validity of the result.

Introduction to Pandas

Pandas is a third-party data analysis library that allows python to read, manipulate, process, and write potentially large bodies of data in comma-separated files (.csv and .xlxs especially). Pandas is what allows *InstantRunoff.py* to take the results of each elected position's qualtrics survey and determine a winner using the ranked-choice methodology outlined above.

Here are some useful links to help introduce yourself to pandas:

Non-technical introduction to pandas and basic concepts:
https://www.learndatasci.com/tutorials/python-pandas-tutorial-complete-introduction-for-beginners/

Official pandas documentation: https://pandas.pydata.org/docs/user_guide/index.html

This (long) video breaks down a number of useful pandas concepts in high detail, but there's an outline to jump to specific topics: https://www.youtube.com/watch?v=vmEHCJofslg

This is a shorter, higher-level overview of the basic concepts and functionalities within pandas:
https://www.youtube.com/watch?v=e60ItwlZTKM