**Improved AI FreeCell Project**

**Implementation and E2E Testing of Empty-to-Empty Moves**

Implementation and end-to-end testing of a feature allowing activation or deactivation of empty-to-empty cascade moves for algorithm testing purposes. When enabled, this feature eliminates unnecessary moves between empty cascades.

**Results:**

* Significantly reduces the number of moves for the 12-card problem (e.g., 12-game2.txt) in both DFS and IDS algorithms
* Primarily beneficial in small game setups
* Full results available in README.md, appendix slide 29, and the Excel spreadsheet

**Implementation and Testing of New Meta-Heuristic**

A new multi-factor scoring system was implemented with the following design:

* Rewards cards in foundations (-10 points per card)
* Penalizes occupied free cells (+5 points per cell)
* Penalizes unordered cards in cascades (+1 point per disorder)

**Results of Meta-Heuristic 2:**

* Very effective for easy setups: fastest on average, with solutions surpassing A\* Heuristic 3 yet still below A\* Heuristic 2
* Better than Meta-Heuristic 1 on hard setups, solving 2 of 4 challenging deals
* Low time and memory consumption for solved cases, though did not successfully solve all hard cases

**Additional Important Improvements**

* Created detailed video tutorial of the entire program with voice narration
* Enhanced README.md with detailed description of algorithm results in section 6 (AI algorithms) and implementation of empty-to-empty moves removal
* Updated presentation slides with new information (slide 17 – metaheuristic2 and appendix slides 27, 28, 29)
* Made minor improvements to the user interface
* Updated Results\_Freecell\_algorithms.xlsx with new results