Gin Rummy Contest Results and Our Next Research Challenge

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Objective and 20/21 Engagement

• Mentored Undergraduate Research Challenge Objective: To ...
  • offer attractive, attainable, introductory research challenges to ...
  • support faculty mentorship of undergraduate research where ...
  • students engage in the full research cycle including: research of prior related work, experimental design, empirical analysis of results, technical article writing, peer review, and (if accepted) conference presentation (where one is often inspired to one’s next work)

• 14 teams of 50 total mentors and undergraduate students submitted 14 AI players for competition evaluation.

• 14 papers submitted for peer review; 13 accepted and presented at EAAI 2021.
Evaluation Process

• 14 players shuffled and split into two pools of 7 players
• Top 4 of each pool advanced to Top 8
• Top 8 evaluated in 10,000 total rounds of play
Group 1 (7 players)

• GinRummyAndTonic_Player
• MARJJ_Player
• AdvancedPlayer
• DePauwPlayer
• GettysburgPlayer
• Tonic
• PrincetonPlayer
Group 1 Top 4

• MARJJ_Player  Elo 1080
• DePauwPlayer  Elo 1052
• GettysburgPlayer  Elo 1041
• GinRummyAndTonic_Player  Elo 1037
Group 2 (7 players)

- DynamicGinRummyPlayer
- DualInception
- Heisenbot
- MyPlayer
- siftagent
- PercentTwenty_Player
- P12
Group 2 Top 4

- Percent20_Player  Elo 1044
- MyPlayer  Elo 1039
- DynamicGinRummyPlayer  Elo 1015
- siftagent  Elo 997
Top 8

- MARJJ_Player
- DePauwPlayer
- GettysburgPlayer
- GinRummyAndTonic_Player
- Percent20_Player
- MyPlayer
- DynamicGinRummyPlayer
- siftagent
Top 8 with Elo

- MARJJ_Player  Elo 1037
- DePauwPlayer  Elo 999
- GettysburgPlayer  Elo 1020
- GinRummyAndTonic_Player  Elo 1012
- Percent20_Player  Elo 1007
- MyPlayer  Elo 1000
- DynamicGinRummyPlayer  Elo 986
- siftagent  Elo 943
A 5000 Game Batch

Player
- ginrummy DynamicGinRummyPlayer
- CinRummyAndTonic_Player
- MARJJ_Player
- MyPlayer
- PercentTwenty_Player
- players.DePauwPlayer
- sftagent.SecondOrderDeadwoodMinimizingAgent
- TaylorPlayer GettysburgPlayer
Top 3 – Congratulations!

• First place: MARJJ_Player
  • A Heuristic Evaluation Function for Hand Strength Estimation in Gin Rummy
    Aqib Ahmed, Joshua Leppo, Michal Lesniewski, Riken Patel, Jonathan Perez, Jeremy Blum

• Second place (tie): GettysburgPlayer
  • Knocking in the Game of Gin Rummy
    Ryzeson Maravich, Taylor Neller, Todd Neller

• Second place (tie): GinRummyAndTonic_Player
  • Extracting Learned Discard and Knocking Strategies from a Gin Rummy Bot
    Benjamin Goldstein, Jean Astudillo Guerra, Emily Haigh, Bryan Cruz Ulloa, Jeremy Blum
What’s Next? AI-Assisted Game Design!

AI MATTERS, VOLUME 6, ISSUE 3

Al Education Matters: 2022 EAAI Mentored Undergraduate Research Challenge: AI-Assisted Game Design

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DOI: 10.1145/3446243.3446247

https://sigai.acm.org/static/aimatters/6-3/AlMatters-6-3-04-Neller.pdf

Or search “AI Matters”
What Is AI-Assisted Game Design

• What distinguishes AI-Assisted Game Design (AIAGD) from AI game play is that the results of an AI technique are applied to the design of the game itself.

• AIAGD *includes* but is not the same as Procedural Generation

• AIAGD also includes:
  • Game Analysis for Game Improvement
  • AI-Assisted Game Invention
  • Other application of AI techniques to Game Design
Game Analysis for Game Improvement

- Discern over-/under-powered (over-/under-used) game elements to nerf/buff
  - Magic the Gathering – recent card bannings (20 in the last 2 years)
  - Fortnite – nerfing/buffing over-/under-powered weapons
AI-Assisted Game Invention

• Cameron Browne’s work
  • Digital Ludeme Project - seeks to express a wide variety of historical games according to game units called “ludemes”.
  • Evolutionary algorithmic approach to computationally design the game Yavalath (Browne, 2011, pp. 75-85).
  • See also Browne’s *Game and Puzzle Design Journal*.

  • Resulted in approximately fair Poker chip variation “Red Light”
Mentored Undergraduate Research Challenge

• A limited number of papers will be accepted for publication and presentation at EAAI-22 that
  • exemplify high-quality scholarly writing, and
  • demonstrate creative application of AI to AI-Assisted Game Design.
• As mentioned, this can take many forms, including but not limited to:
  • Existing game improvement through AI game analysis,
  • New game design through AI search in a design space,
  • Adaptive technologies shown empirically to improve player experience, and
  • AI procedural generation of game play elements.
• Teams must include at least one faculty mentor and at least one undergraduate. Faculty mentors will be expected to review. (Contact Todd Neller <tneller@gettysburg.edu>.)