Eye Tracking in a Digital Hanabi Game

Eve Gottwald, Markus Eger, Dr. Chris Martens
egottwa@ncsu.edu, meger@ncsu.edu, cmartens@ncsu.edu

MILLS COLLEGE

NC STATE UNIVERSITY

POEM
Principles of Expressive Machines

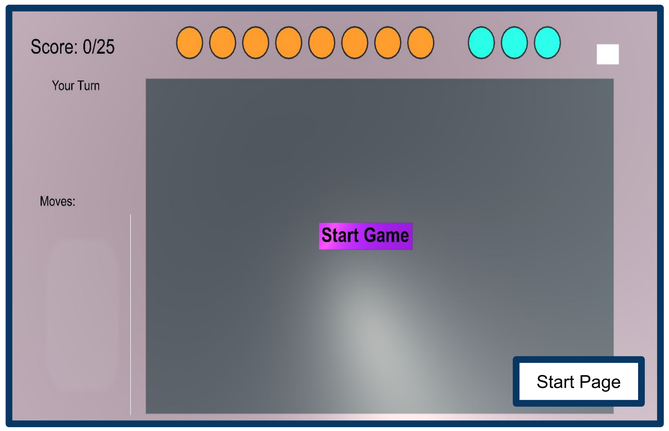
Research Objectives

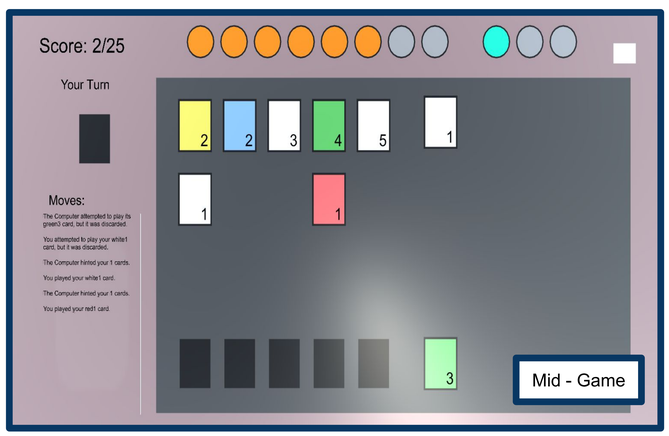
- Implement Hanabi in Unity
- Add eye-tracking capability
- Generate and analyze eye-tracking data
- Incorporate AI into the Unity version of the game
- AI uses eye-tracking data to inform its knowledge about players actions and the contents of it's hand.

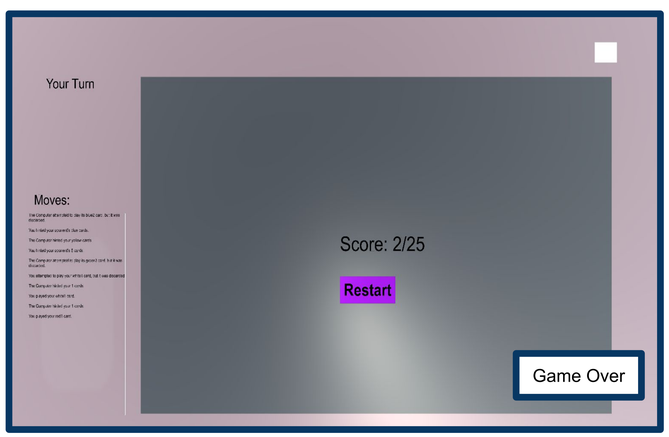
About Hanabi

Hanabi is a cooperative card game with 2-5 people per game. Each player can see everyone else's cards, but not their own. Players work together to build sets, or "fireworks" ordered from 1 to 5 in each color. On each players turn they can either give a hint about another players card, play a card that they think will build on one of the sets, or discard a card.

unity







Discussion of Findings

- The eye-tracker is able to detect which areas of the board a player is looking at, and how often.
- This data can potentially be used to determine player intentions
  - Deciding between which cards to hint about, etc.
- AI gains ability to interpret information through non-verbal communication

Future Implications

One interesting challenge would be to expand this project to include

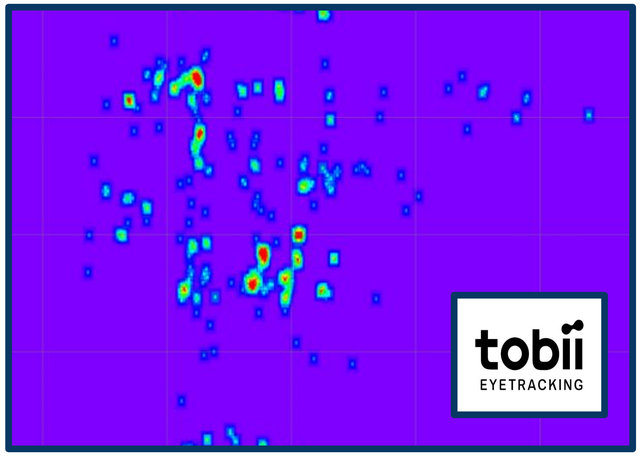
- More than 2 player options
  - AI then must choose which player to hint to, if any.

Humans use many nuanced, nonverbal communication techniques:

- Eye movement
- Body positioning
- Facial Expressions

AI being able to utilize this data has many implications such as:

- Intention recognition
- Improving game-play
- More flawless human-computer interaction in many fields
- Artificial intelligence becoming increasingly more human-like



Heat Map Interpretation

- Depicts a player's gaze while playing Hanabi on our Unity implementation.
- Corresponds to same space as the screenshots in column 2.
- Uses HSV color scale from purple to Red, wherein:
  - Red areas have highest gaze activity, and the purple/blue sections have little to none.

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eveatncsu.wordpress.com