JKU

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AI and Visualisation
Assignment 1

November 5, 2024 | Group name: Lazy Legends

Agenda

1. Data Preparation & Final Data

2. Projection
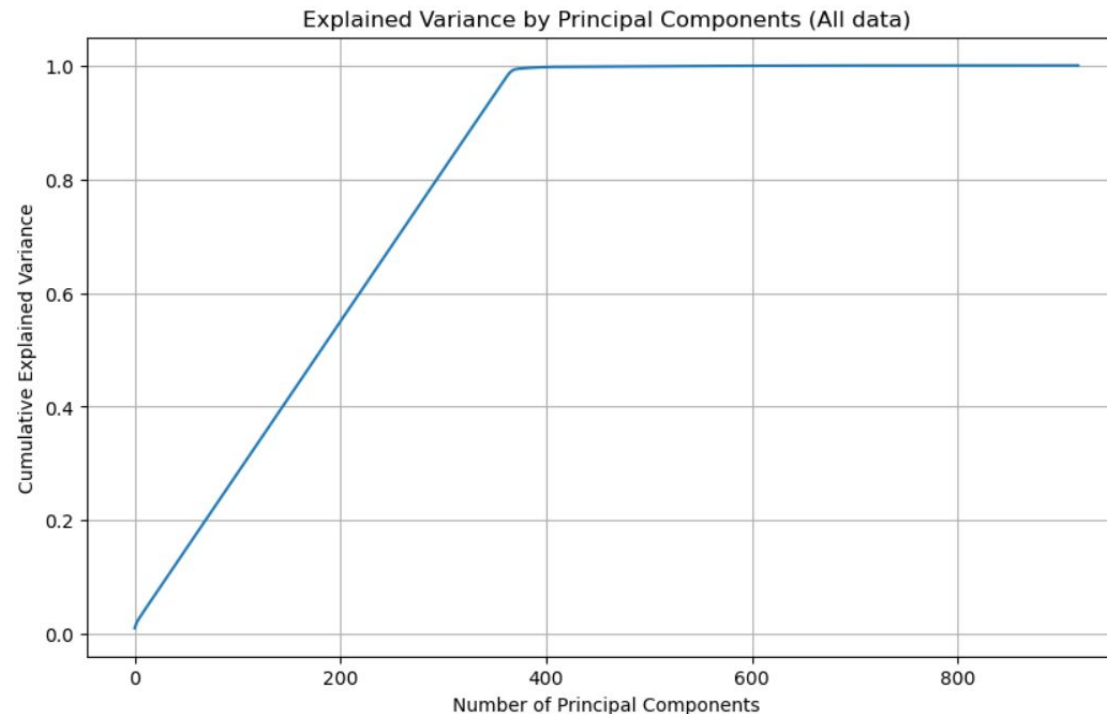
3. Link States

4. Meta Data Encoding

5. Results

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Data Preparation & Final Data

GO game

- 44 games from 44 .sgf files (6 games played by us, 38 games downloaded from https://www.gokgs.com/)

- Board states (from .sgf file) and player info columns (from .sgf file and Excel) → merged them to one dataset where one row contains one step within the game, games are distinguished by game_id

- Final dataset contains 384 features and 9775 samples → high dimensional dataset

- Games categorized into beginner, intermediate and master level based on Area scores achieved by our player:

  - Beginner: 14

  - Intermediate: 22

  - Master: 8

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Projection

- **T-SNE, UMAP** for most applications unfortunately did not give us meaningful insights when we included all features (they produced decent plots when including only player info columns but no board states). One meaningful T-SNE graph, however, is also included.
- **PCA:** shows us that it makes sense to use this downprojection on the data when considering all features
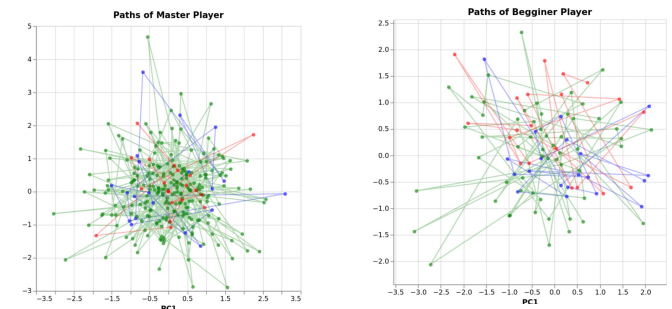
Projection - PCA I.

- **Players of the same level have similar approaches**
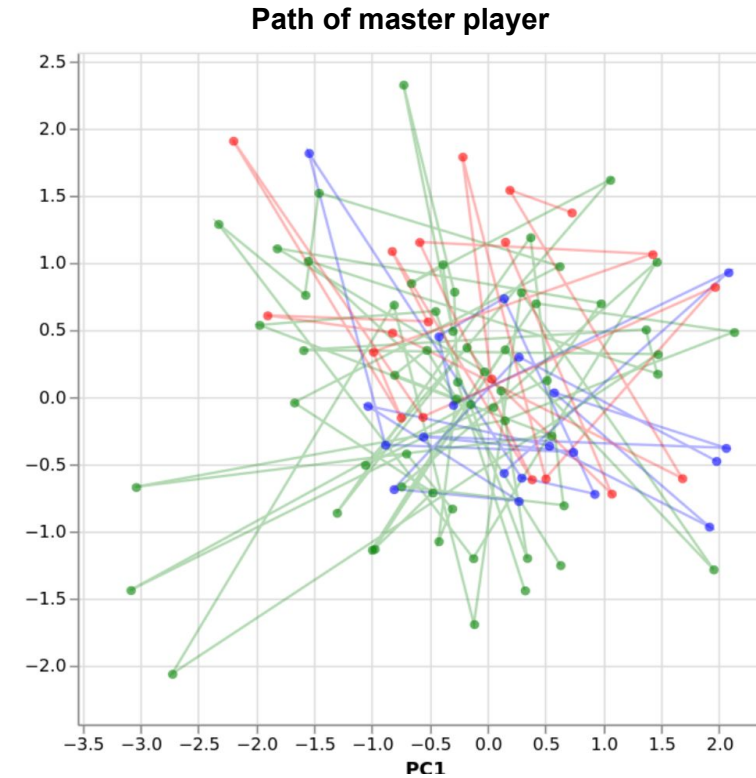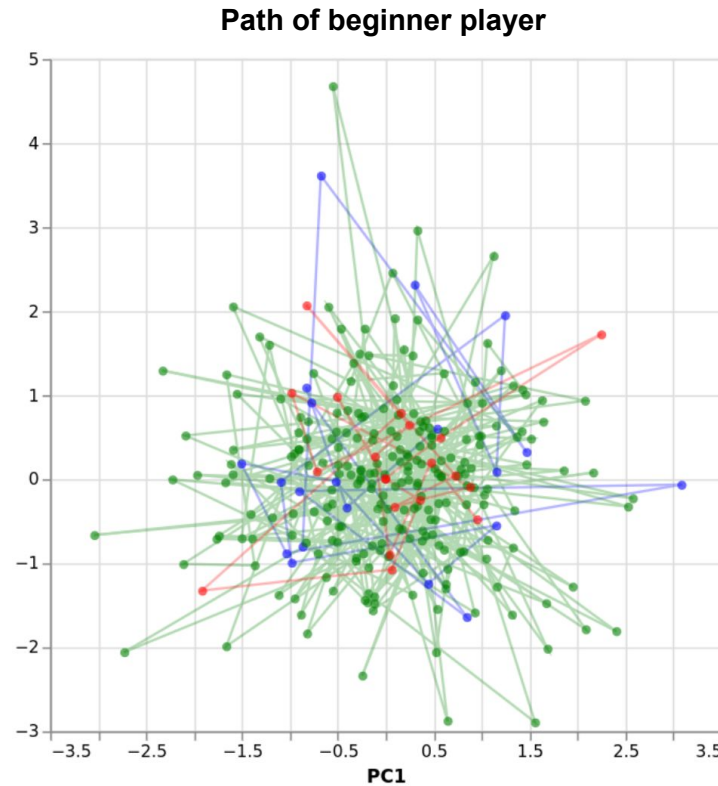

3D Plot of PC1, PC2, and PC3
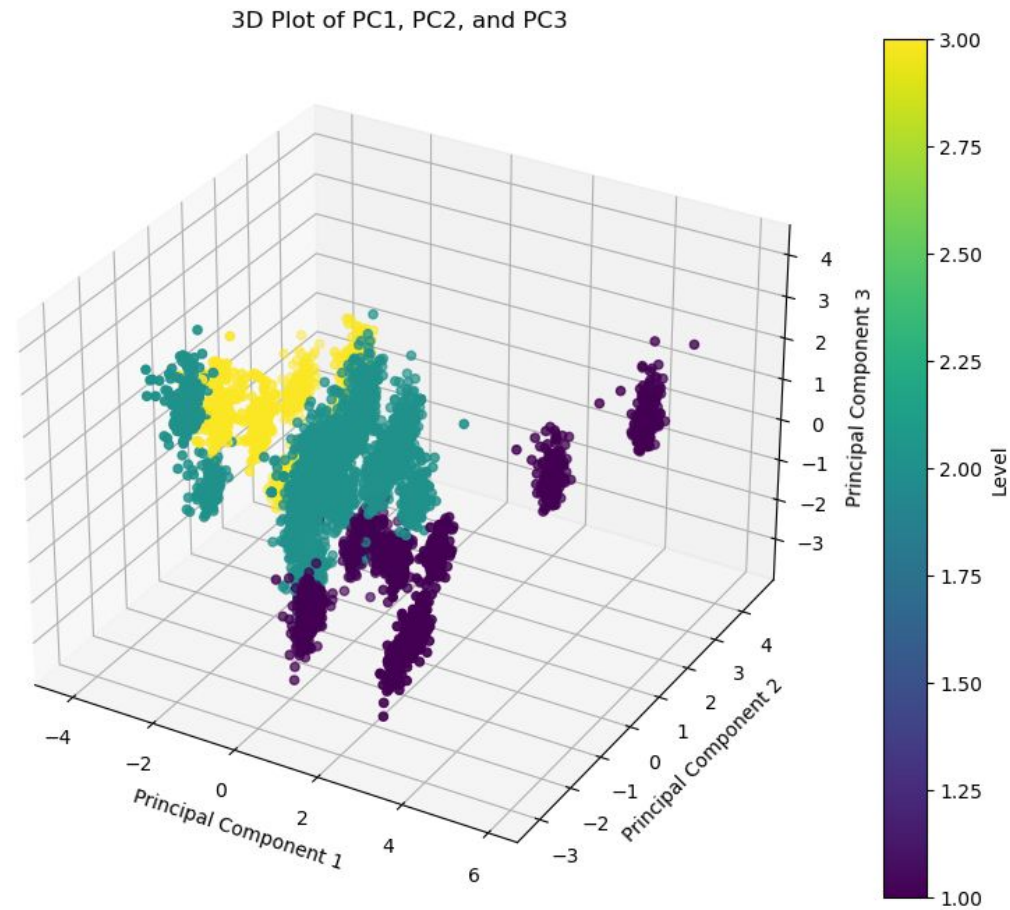
Link States

- **The comparison** of move progression between a master player and a beginner player in Go aims to visualize and contrast their move sequences throughout the game.

- **The key features** of the visualization include color-coded phases to distinguish between different stages of the game: blue for the opening phase (starter), green for the middle game (intermediate), and red for the endgame phase (final).

- **The visualization** shows the sequential progression of moves for each player, with lines representing the moves ordered by their move_id. This highlights how the game evolves step by step. Each move is represented by a circle, color-coded by its phase, providing a clear view of how each player transitions through the various stages of the game.

Paths of Master Player

Paths of Begginer Player

visualizations on next slide

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Link States

Path of beginner player

Path of master player

The **master player's** path generally shows more refined strategies, with smoother transitions between different phases of the game. In contrast, the **beginner player's** path tends to be more inconsistent, with less strategic depth and more abrupt changes between phases.

Comparing the two players' move paths side by side provides a clear visual distinction between their strategies and decision-making, highlighting how experience shapes gameplay in Go.
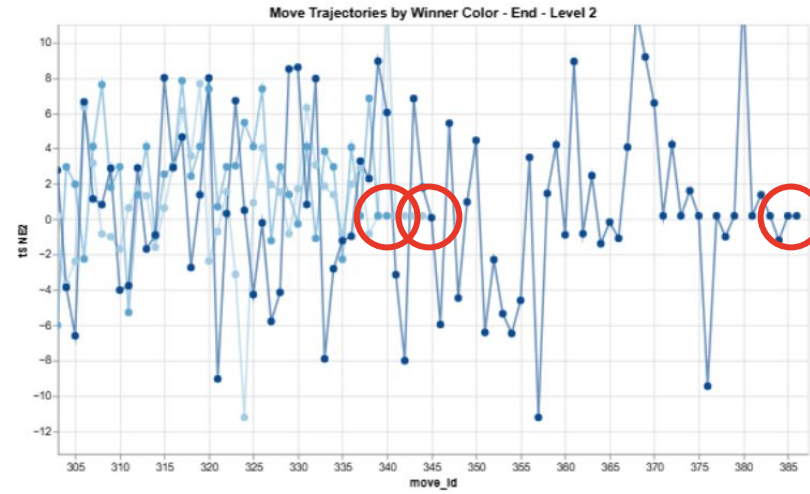
Link States

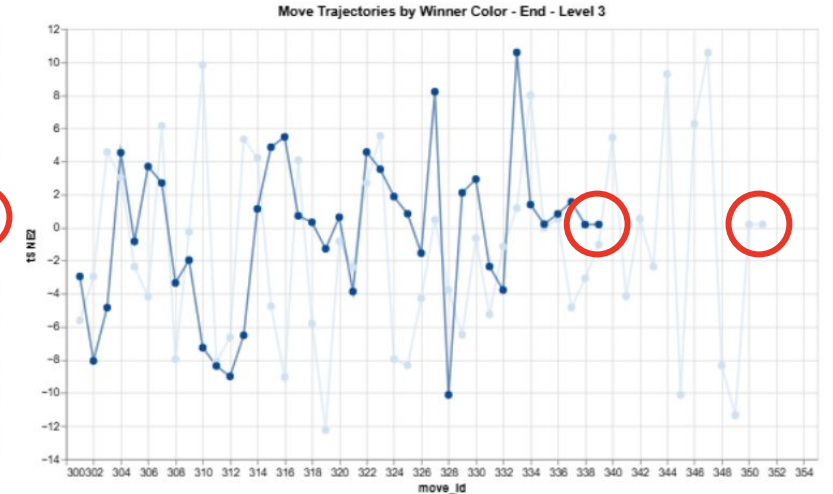Move Trajectories by Winner Color in the End of a Game

Level 1
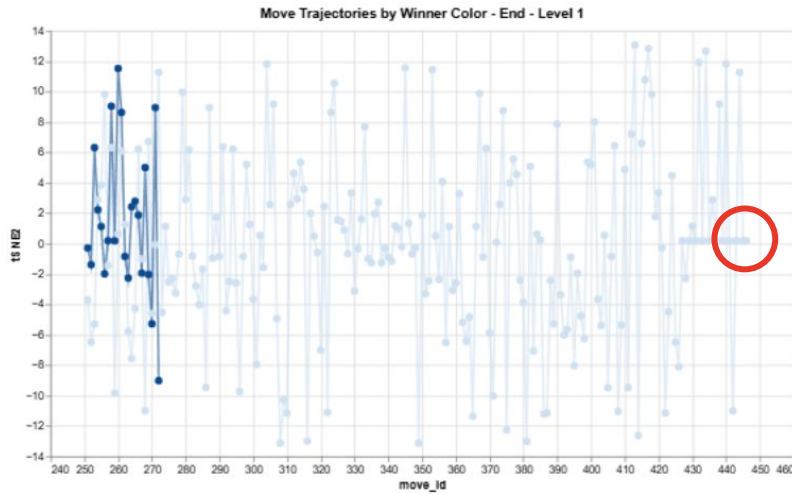
Level 2

Level 3

Most games end at the same point, at 0 on the y-axis.

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Meta Data Encoding I.

We extended our PCA visualisations with some additional meta data encoding by including the following features:

- **Result:** whether the game finished with an exact win (score) or with the opponent resigning (resign)

- **Area_winner_color:** the color of the player who had higher total area score in the end of the game

- **Territory_winner_color:** the color of the player who had higher total territory score in the end of the game

- **Winner_color:** the color of the player who won the game

Let's see some plots on the following slides…

Meta Data Encoding II.

There are some games where different players won based on Area and Territory scores

→ can indicate different endgame strategies

PC1 vs PC2 with Area_winner_color and Territory_winner_color
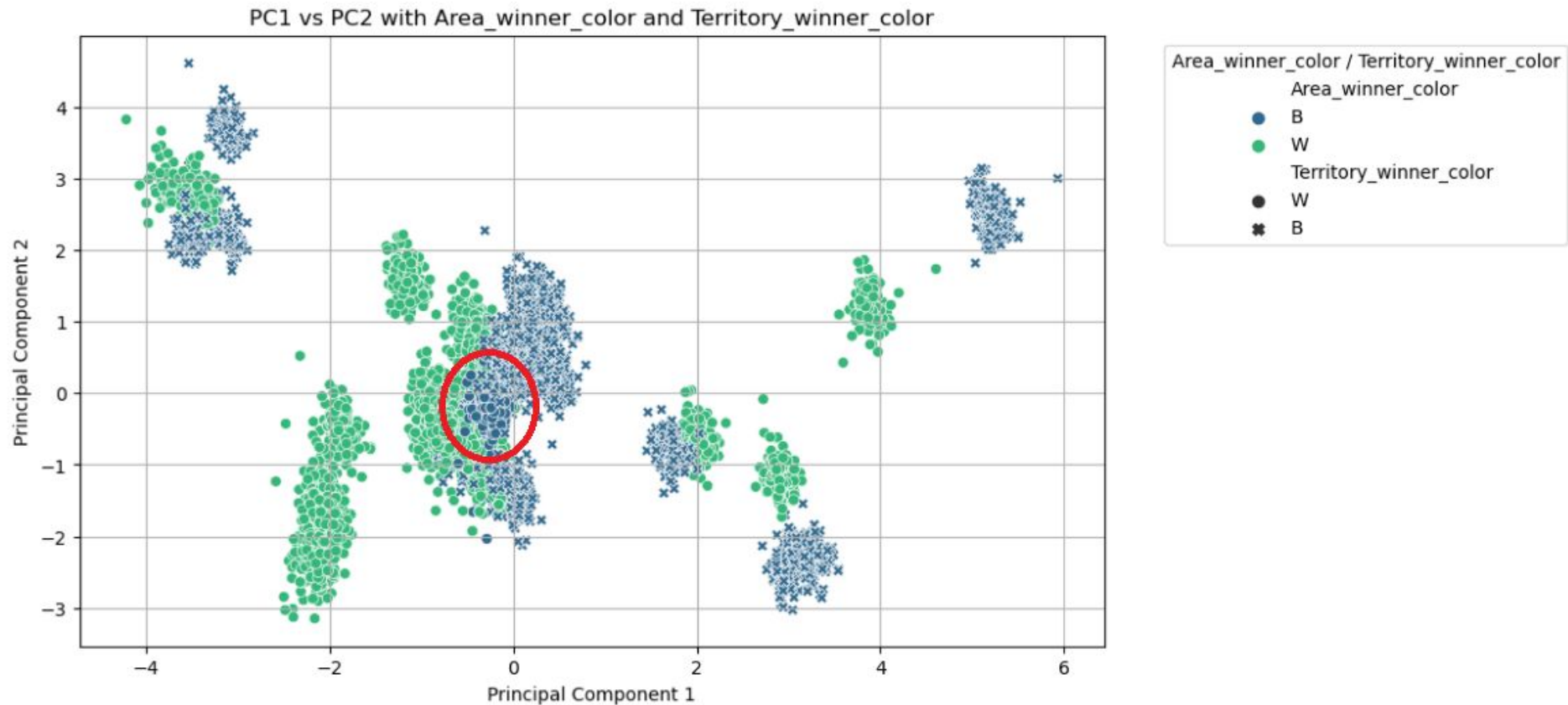
Meta Data Encoding III.

- Most master level games tend to end with resigning (see red circle)

- It is also a tendency for beginner games

- But not necessarily for intermediate games (see gray circle)

PCA: PC1 vs PC3 with Result and Level Encoding
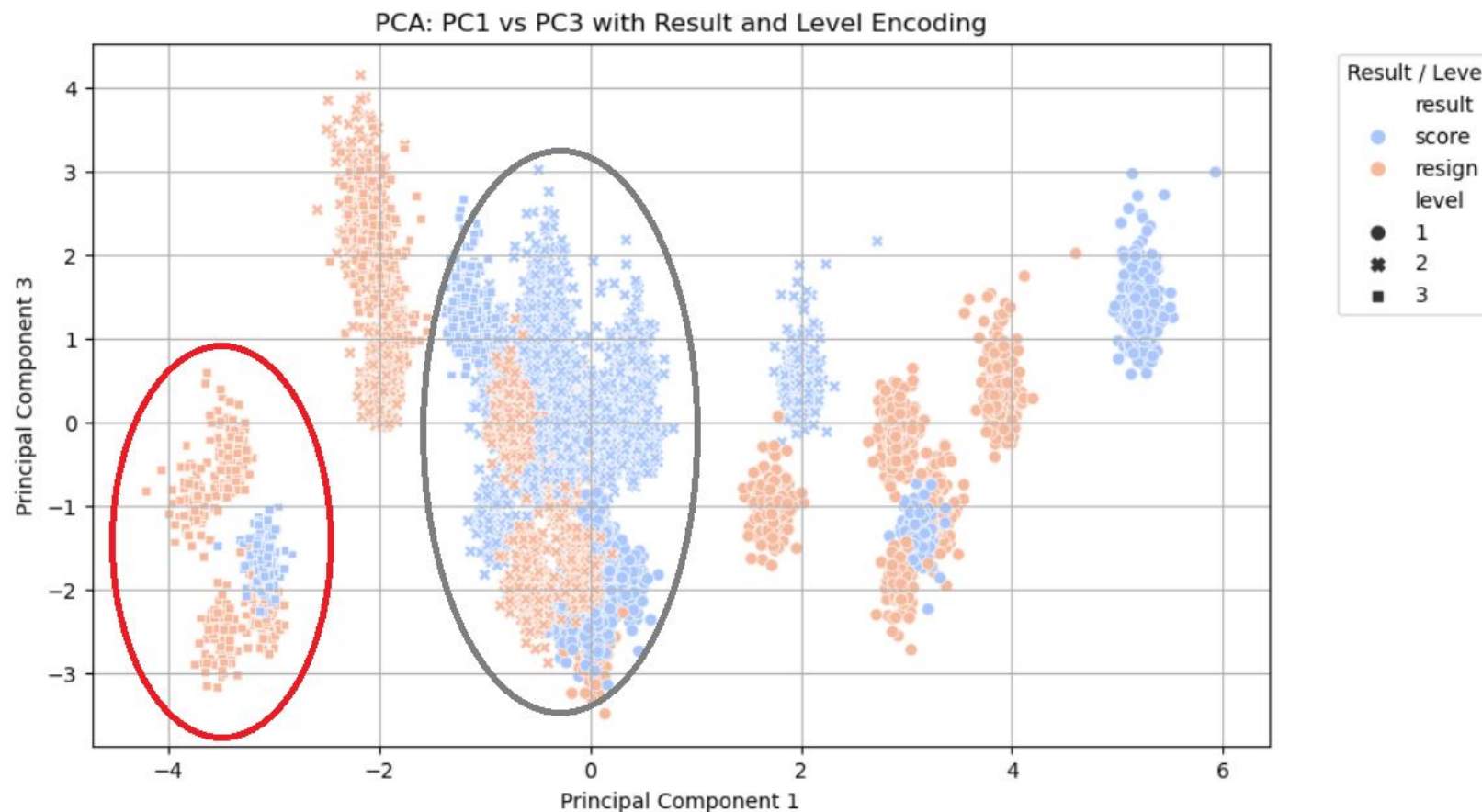
Results

What can be seen in the projection(s)?

- Players of the same level have similar approaches
- Players of different levels have different approaches (master player has different approach than beginner player)
- On average, master games are shorter (contain less steps) than beginner games
- Beginner games tend to include more abrupt phase transitions (for example tend to end games more abruptly)
- Ending states are not so diverse (Most games end at the same point)
- There are some games where different players won based on Area and Territory scores
- Most master level games tend to end with resigning, it is also a tendency for beginner games, but not necessarily for intermediate games

Was it what you expected? If not what did you expect?

- **Mostly yes, but there were some exceptions:**
  - Ending states are not so diverse → we expected to identify more diverse ending states
  - For both master and beginner games it is a tendency to end the game with the opponent resigning → we only expected to see this for master games

Can you confirm prior hypotheses from the projection?

- **Yes, for example these ones:**
  - Different approaches by the expertise level of the players: master players display more sophisticated strategies
  - On average, master games are shorter (contain less steps) than beginner games

Did you get any unexpected insights?

- Players of the same level have similar approaches
- Ending states are not so diverse (Most games end at the same point)
- Most master level games tend to end with resigning, it is also a tendency for beginner games, but not necessarily for intermediate games

Thank you!

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