**Team 13 Product Backlog**

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**Problem Statement**

Artificial Intelligence (AI) is becoming very popular in both games and simple life management. There exist many AI for simple games like Poker, Chess, or Go. However there does not exist any AI for popular humor-based card matching games such as *Apples to Apples* and *Cards Against Humanity*. We would like to create a generic AI for playing games like these. This could also potentially allow people to play games like these without many players, helping lonely people be less lonely.

**Background Information**

Our team is very interested in AI. We have seen AI do incredible things, but most of the problems they solve are games that involve strategy, such as *Chess*, *Go*, and *Checkers* games that every move could have consequences on every other move after that. We want to see if we can make one that can win at a game based on humor. Cards Against Humanity is a game that we love and is won by being witty and humorous. There are also online versions of the game available at Xyzzy, that we can build our AI to play on. We think it would very exciting if we can build an AI that can win games on this website.

**Project description**

Our project is making an AI that can play the game *Cards Against Humanity*. *Cards Against Humanity* is a card game where a series of players take turns matching cards. One player chooses a topic card called a black card. An example black card might be “Who stole the cookies from the cookie jar?” The rest of the players then choose a white card from their hand that they think would be funny with the black card. An example one of these might be “famine.” Then, the player who played the black card chooses the white card that he thinks is the funnest. The player who played the chosen white card then gets to keep the black card. The first player to reach 7 black cards wins the game. Players each start with 10 cards in their hands and draw a new white card after each round.

There is a website to play this game online. The website is <http://www.pretendyoure.xyz/zy/>. Our goal is to create a bot to play on this website and be able to win games. The user will be able to start and stop this bot from a UI and be able to see heuristics about the AI’s game. They will also be able to watch the AI play the game on the website.

The program is made up of four distinct parts; The database, the website interface, the user interface, and the AI.

* Website Interface
  + The website interface will be able to connect to the website Xyzzy. Xyzzy is a website that hosts games of Cards Against Humanity. Our program will play and observe games on this website. The interface will allow the AI to interact with the website.
* The AI
  + The AI will be the main part of our program. The AI will be given a game state, and be able to determine the best course of action. It will either be given the game state from the website interface or from the user interface manually
* User Interface
  + The user interface will be what the user sees when they start our program. There will not be a large amount of options on it but it will allow the user to tell the AI what mode to operate in. The user can put it in offline mode where they will manually input the board state and then have the AI tell them the response that would be best.
* Database
  + The database will contain all of the information that the AI has gathered from its games. It will also be how the AI will decide which card to pick. It will contain each card and also the metadata about those cards.

**Environment**

We will use Java for the interface, GUI, and AI and SQL Database for the card combinations, and HTML for parts of the Graphic Interface. We will be downloading web pages, parsing downloaded web pages, simulating mouse/keyboard inputs, manipulating databases.

**Functional**

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| # | Functional requirement | Hours to complete | Status |
| 1 | As a user, I would like to use a user interface to select a game to spectate or play | 4 | Planned for sprint 2 |
| 2 | As a user, I would like to have a database that can store information about the cards in the game | 5 | Planned for sprint 1 |
| 3 | As a user, I would like to have an interface that can identify elements of the web page. | 25 | Planned for sprint 1 |
| 4 | As a user, I would like to have an interface that recognize game components from the elements of the webpage | 10 | Planned for sprint 1 |
| 5 | As a user, I would like to have an options menu from which I can tell the AI to not adjust values in the database. | 5 | Planned for sprint 2 |
| 6 | As a user, I would like to have the AI to be able to connect to, write to, and read from a clean database | 2 | Planned for sprint 1 |
| 7 | As a user, I would like to have the AI to be able to interact with the online interface provided to it. | 2 | Planned for sprint 1 |
| 8 | As a user, I would like to use the AI in an offline setting after a certain amount of training | 4 | Planned for sprint 1 |
| 9 | As a user, I would like to have the AI be able to handle bugs in the SQL database | 1 | Planned for sprint 2 |
| 10 | As a user, I would like to have the AI be able to distinguish weightages among card combinations and choose the highest available one | 4 | Planned for sprint 1 |
| 11 | As a user, I would like to have AI that can play with or without the rule you can exchange your hand by paying a black card | 4 | Planned for sprint 2 |
| 12 | As a user, I would like to have the AI be able to differentiate between card combinations of equal weightage | 1 | Planned for sprint 1 |
| 13 | As a user, I would like to have AI that can adapt to different senses of humor | 10 | Planned for sprint 2 |
| 14 | As a user, I would like to have a database that keeps track of in-game Statistics | 3 | Planned for sprint 1 |
| 15 | As a user, I would like to have an AI that knows when to get rid of bad cards in in the hand (AI knows when to play a throw away round) | 4 | Planned for sprint 2 |
| 16 | As a user, I would like to have an options menu from which I can tell the AI to play with more or less functionality | 3 | Planned for sprint 2 |
| 17 | As a user, I would like to have an AI that is able to make decisions about the game, understands the state the game is in, and can interact with the correct interface accordingly. | 4 | Planned for sprint 1 |
| 18 | As a user, I would like the AI to be able to pick white cards for black cards that require two or three white cards | 15 | Planned for sprint 2 |
| 19 | As a user, I would like to have an options menu from which I can tell the AI to find a new game when the game ends automatically | 5 | Planned for sprint 2 |
| 20 | As a developer I would like the AI to keep track of wins and losses across play sessions | 1 | Planned for sprint 1 |
| 21 | As a user, I would like the AI to add a black or white card to the database if it sees one that it does not recognize. | 3 | Planned for sprint 1 |

**Non Functional**

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| Backlog Id | Functional Requirement | Hours | Status |
| 21 | As an opponent I would like to not be able to notice that I am playing against Artificial Intelligence. | 5 | Sprint 1 |
| 22 | As an opponent I would like to have the AI judge my card the same way everyone else would. | 5 | Sprint 2 |
| 23 | As an opponent I would like to Have the game still be enjoyable, despite AI being used. | 2 | Sprint 1 |
| 24 | As a offline player using this AI I would like to be able to read and comprehend what the AI is telling me to play with ease | 8 | Sprint 2 |
| 25 | As a offline player using this AI I would like to have the AI make decisions quickly and efficiently | 3 | Sprint 1 |
| 26 | As a offline player using this AI I would like to have a user interface that allows me to input information easily. | 6 | Sprint 2 |
| 27 | As an online player using this AI I would like to have an AI that wins frequently | 4 | Sprint 2 |
| 28 | As an online player using this AI I would like to have an AI that is genuinely funny | 6 | Sprint 2 |
| 29 | As an online player using this AI I would like to have an AI that seems human | 2 | Sprint 1 |

**Use Cases**

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| Case: Select Spectating mode |  |
| Action: | System Response: |
| 1. The user selects spectate mode from the UI | 2. The system automatically connects to an online website and observes games being played while tracking winning card combinations and updating its weightage system appropriately |

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| Case: Select Play mode |  |
| Action: | System Response : |
| 1. The user selects play mode from the UI    3. The user can watch the AI play | 2. The system automatically connects to an online website and begins to play Card Against Humanity with other people. The AI uses it’s database of card weightages to select the best white card from its “hand”. For every round it updates its weightage system based on the winning combination. |

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| Case:Select Offline mode |  |
| Action: | System Response |
| 1. The user selects offline mode from the UI  3. The user inputs the games current cards into the UI  5. The user plays the card the AI suggested  6. The round ends, new white cards and black cards are given  7. The case restarts from step 3 until game ends | 2. The system loads a UI where the user can easily input the white cards in his/her hand and the current black card  4. The system tells the user the best card to play for the current round |

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| Case: Game Ends |  |
| Action: | System Response |
| 1. The Game Ends  3. If 2a. User selects a new room  If 2b. Game selects new room | 2. Based on settings, the AI can either   1. Return control back the user to find a new lobby 2. Find a new lobby automatically   4. AI checks settings to see if it is on spectate or play mode  5. Joins Room as either a player or a spectator based on the result of 4 |

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| Case: AI views winning combination |  |
| Action: | System Response: |
| 1. AI scans black Card, and white card combination | 2. AI modifies weight of Card combination accordingly (in the database)  3. Database inserts the new weight for the card combination in the table specific to that black card. |

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| Case: AI wins round |  |
| Action: | System Response: |
| 1. Notification that the round was won is sent to the AI  4. New White card is received | 2. AI sends request to the database to increase the amount of rounds won and rounds played  3. AI views Winning combination (See Use case #5)  5. AI inserts value for the new white card into its hand. |

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| Case: AI loses round |  |
| Action: | System Response: |
| 1. Notification that the round was lost is sent to the AI  4. New White card is received | 4. AI sends request to the database to increase the amount of rounds played but not rounds won  3. AI views Winning combination from other player’s hand (See Use case #5)  5. AI inserts value for the new white card into its hand. |

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| Case: User Adjusts Options |  |
| Action: | System Response: |
| 1. User sends a request to see the options  3. User selects based on his choice | 2. Interface switches between regular page and options page  4. AI sets boolean values accordingly |

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| Case: User limits AI functionality |  |
| Action: | System Response: |
| 1. User sets option  3. Later, AI makes a play | 2. AI sets boolean value to true  4. AI checks boolean value and avoids doing certain checks and certain functions |

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| Case: Plays Game in which black card rule is in play |  |
| Action: | System Response: |
| 1. User sets option in options menu  3. Later, AI makes a play | 2. AI sets boolean value to true  4. AI checks boolean value and does analysis to determine whether |