TP Design Proposal
Emma Kulbida

TP Name: Escape the cave

Project Description: You enter a cave and try to find your friend (go through a randomly generated maze), there are slimes that will attack you (AI) and you have 3 lives before you lose the game. The maze is dark, and your surroundings are lit up by a torch that you hold and can turn off

Competitive Analysis:

This game has a similar idea to pacman, where there are slimes (that act like the ghosts) that attack you. Unlike pacman, these slimes are attracted to your torch so when you turn the torch off, they won't be able to see you. Also, you will be able to collect power-ups such as speed/shield in the maze that will protect you for a certain amount of time. The goal is to make it to the chamber in the bottom right where your friend is stuck, and walk out of the maze together. There won't be coins or anything like pacman, and the maze will look different (less loopy but still multiple ways to get around, also depends on the difficulty level)

Structural plan:

Different .py file for main character class, file for slime class (might combine),

Different modes (startScreen, gameplay, lostGame, wonGame)

Functions such as make maze and AI functions will be the bigger functions, and there will be a lot of functions that take up different tasks such as drawing characters/slimes/walls/background/etc.

Algorithmic plan:

Maze generation

- Modified prim's algorithm, already implemented
    - Modify it so there is more than one way of getting around the maze

Ghost AI (similar to pacman)

- One of them calculates distance between possible moves and target, only moving in directions forward, left, right unless there is a wall. Chooses direction that has the smallest distance linearly
- Scatter state (torch off):
    - Each slime targets a different tile (targets could be in the corners)
- Chase mode, each ghost has different ways of generating target tiles

        - #1: Where pacman is
        - #2: 4 tiles in front of pacman
        - (maybe) #3: Dependent on the first one, pick point is 2 tiles in front of mc and get direction to #1, then flip (so pacman gets cornered)
        - #4: if mc is within 8 tiles, targets pacman, otherwise targets random (scatter state)
    - Store target in class attribute, mail algorithm in gameplay functions, not a different class for each ghost, update in timer fired (timer fired calls functions to update each target)

Darkness and torch

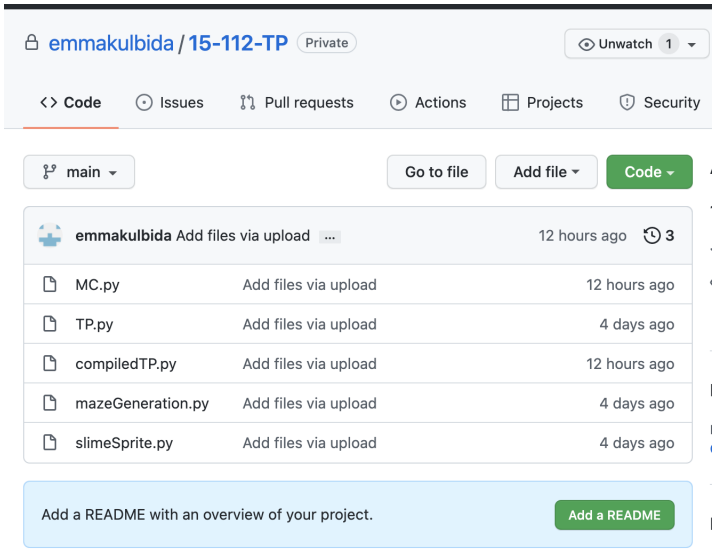
- Finding a way to illuminate surroundings and keep everything else black except for slimes and chamber
- Deal with RGB, iterate through each pixel and see if it's within range of the torch, if it overlaps with a slime, etc.

Timeline Plan:

- 4/15-4/18
    - Figure out darkness and torch
    - Powerups / collectables:
        - Speed increase dX, dY
        - Shield
            - When collision with slime, doesn't take away life
        - Key to unlock chamber
        - Another key to exit whole maze (win)
    - Slime class
    - Draw slimes, put slimes in maze, coordinate movement for scatter state
    - Win screen
    - Figure out how to get friend to follow mc out of maze
- 4/18-4/20
    - Figure out slime chasing AI
- Should be done with MVP by then

Version Control Plan:

- Uploaded all my code into github



Module List:

- No external modules (just tkinter, PIL, random)

TP2 Update:

I added a key and a door, so you exit the maze by collecting the key and unlocking the door. I also added the torch lighting up and darkness by making a list called app.lightCoordinates, and I updated this list every time timerFired ran. I used this list in my draw function, and if coordinates were not in app.lightCoordinates, I drew a black square instead of the maze. No other design changes were made.