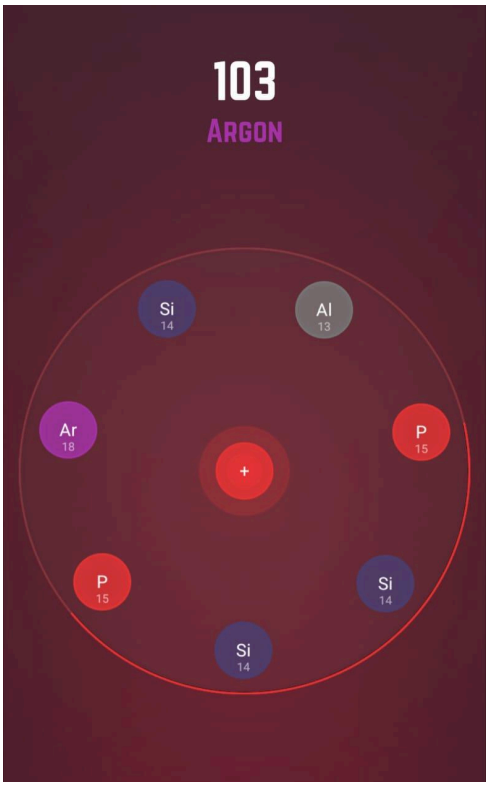
# Project Proposal - Intro to AI

# Atomas Game

Ayelet Rosenzweig 318756152
Sharon Carmeli 318461274
Amir Tuboul 208588244

1. The problem we chose is optimizing the gameplay strategy for the mobile game Atomas. Atomas is a science-themed puzzle game where players combine elements to form higher atomic numbers and gain a score. The game starts with a small collection of atoms arranged in a circular board. Players place atoms and special orbs like the plus (+) orb, which combines two identical atoms into one with a higher atomic number, creating chain reactions. The game ends when the board is full and no more atoms can be added. We chose this problem because it presents an interesting combination of strategic planning, probability, and optimization. Additionally, Ayelet is an avid fan of this game and has been developing her own “algorithms” for the game over the years. We are interested in seeing how well AI will perform compared to an expert player.




2. Atomas has some similarities to the game 2048. Both are puzzle games where you combine identical objects and try to maximize both your score and your highest tile/atom. Because of this, we thought to first try the algorithms we used in the 2048 exercise: Minimax and its variations, and search algorithms with a heuristic function. We also thought we’d try using Reinforcement Learning algorithms such as Q-Learning because they work well with decision-making games, allowing the agent to learn optimal strategies through trial and error.

3. We did not find anyone who has tried to solve this problem before. There are many solutions for other puzzle games such as 2048 and Flow, but Atomas is not as popular, which is why we think it hasn't been done before. This lack of prior work presents an exciting opportunity to explore new ground.
4. When playing the game, whether you decide to optimize for the highest atom or the highest score has a significant impact on your strategy. These two goals can even contradict each other; trying to achieve the highest score might result in a lower highest atom. We want to examine both approaches. Metrics will include the average score per game, average highest atom per game, the number of games exceeding certain score thresholds and atom thresholds, and the consistency of high scores and highest atoms. We will compare the algorithms' results to one another, to simpler rule-based algorithms, and to our own human results.
5. The actual game is much more complicated than what we explained. There are special atoms, special actions you can take, and upgrades. For this project, we will start by simplifying the game as much as possible, but as we progress, we might gradually add back these complications.