Corey Crooks
ccrooks6@gatech.edu
Project 3 Reflection
GtID: 903130397

Project 1 and 2 Overview:

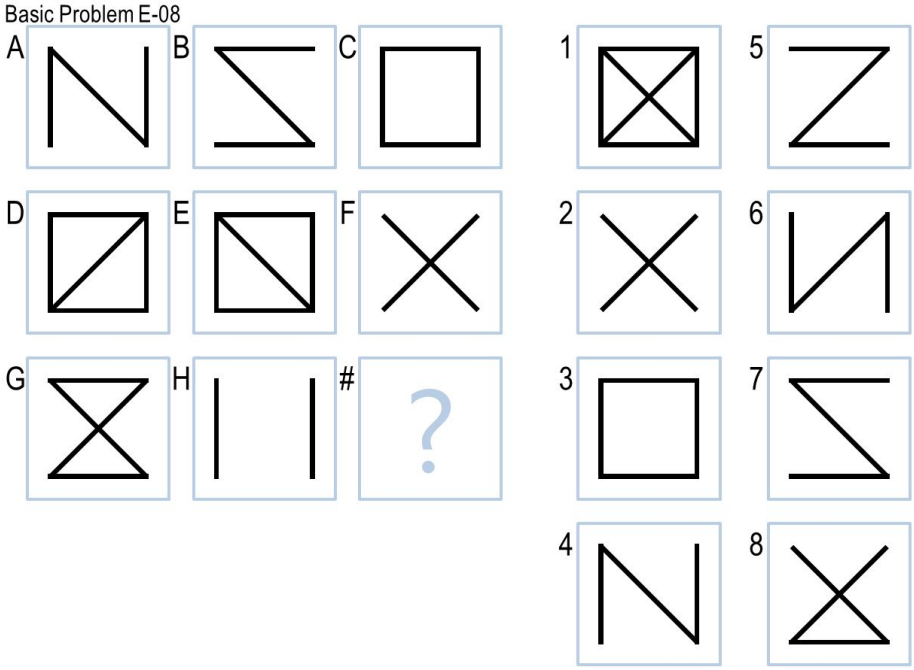
The agent's reasoning approach was the verbal approach. I started Project 1 attempting to solve using verbal only and continued to use verbal for the second with the intention of using a more hybrid (visual and verbal) approach. Verbal reasoning seemed like it would be much easier to implement because I had very little experience programming in Python before starting Project 1. After becoming more familiar with Python, I felt more capable of using different libraries such as Pillow which would make Project 3 less intimidating.

```
2x2
true
true
A
        a
                shape:square
                fill:yes
                size:very large
B
        b
                shape:square
                fill:yes
                size:very large
C
        c
                shape:square
                fill:yes
                size:very large
```

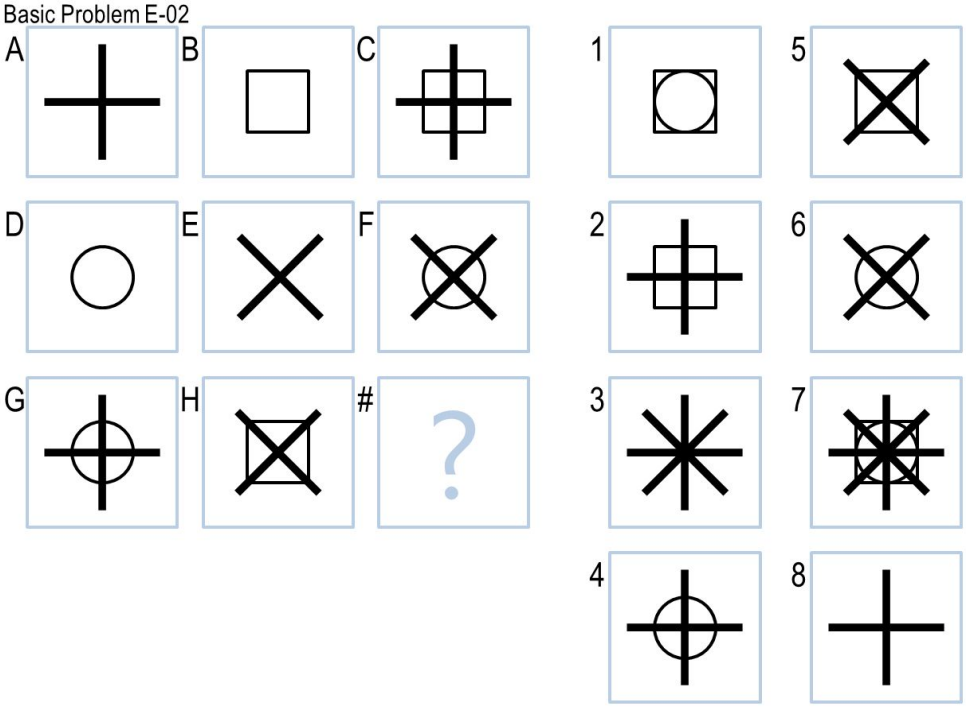
Changes in problem set & Agent's Reasoning:

When attempting to build on my agent for Project 3, I had found the changes in the problem sets improved my agent drastically. When you look through problem sets D and E, there are many new transformations not yet seen by my agent, specifically new logic combinations. The example below E-08 shows a new type of transformation that my agent has not seen before which is XOR of A and B.

Basic Problem E-08



Basic Problem E-02



My agent's reasoning starts as a human would solve the problems. I had to take the reasoning to another level in a way that would solve the problem in a way that I would. I took each problem, solved the problem myself and then categorized each problem that was similar to a previous one. This would allow me to use my agent to solve the problems with the most similarity.

I continued to follow the structure I used for Project 1 and Project 2 with Generate and Test. I would loop through all of the potential answers, measure the similarities and transformation within the semantic net and then compare to each other. The transformations are then weighted (as we seen within our lectures) to reach a potential answer.

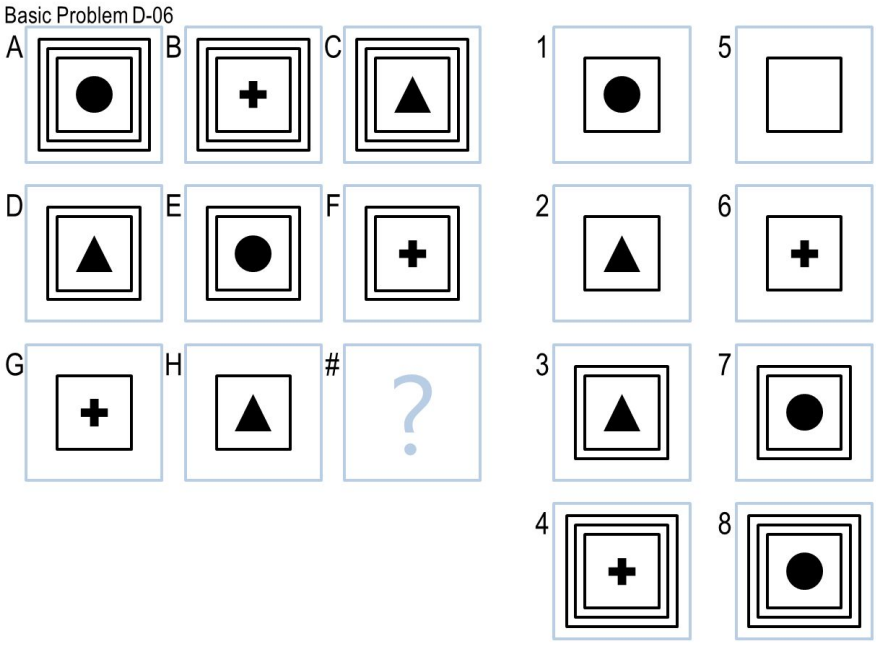
One of the challenges that I faced was spending more time that I liked with object and pattern recognition. I really had a hard time figuring out how to process each of the images after coming from a verbal approach. I really would of liked to been able to use object and pattern recognition instead of computing all of the pixels within each picture.

Agent Capabilities:

My agent did not change the functionality for handling the old 2x2 problems. For all of the previous problems that my agent had seen, it continued to use the process used in Projects 1 and Project 2, however it handled visually. The core of the design was used which follows the approach stated in the Project 1 and 2 reflection. The changes that the agent faced as stated above were new logical transformations never seen before along with the implementation of visual comparisons. The approach of solving was different than Project 1 and 2 because I solved each and every problem in D and E sets first. In Project 1 and 2 I built the logic for the problems to solve and noted how they performed when seen similar problems. Project 3, I classified groups of problems that were similar after solving myself and then tried to build my visual agent to solve them.

Agent Limitations:

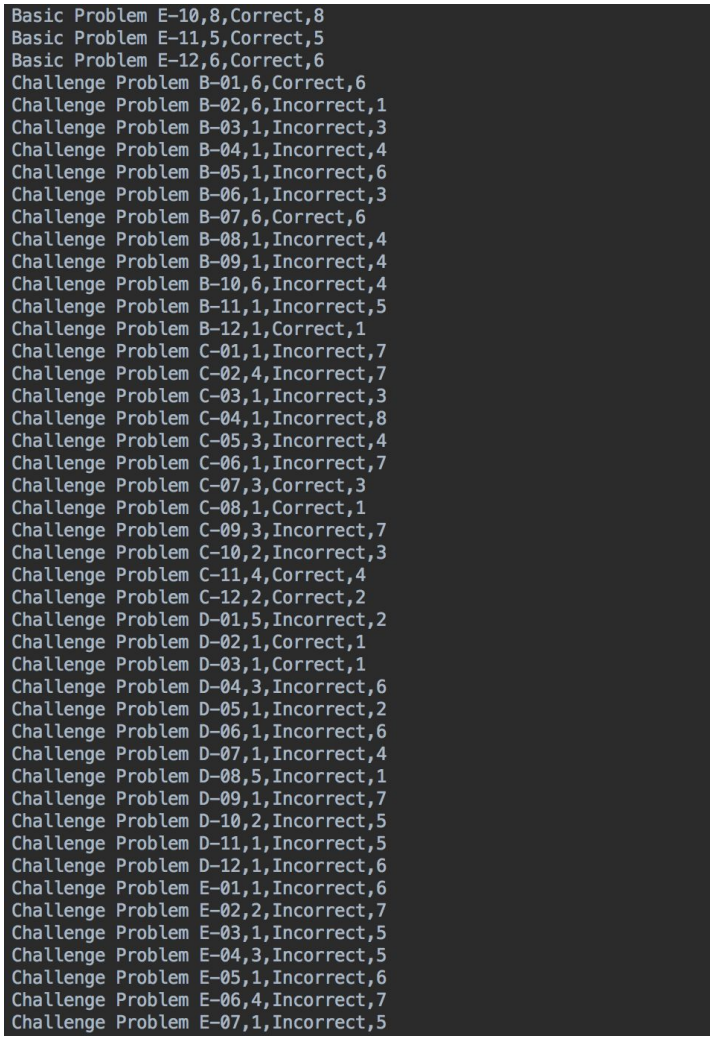
The agent solves a lot of the problems well, however it does have some limitations. For example, there are a few mistakes the agent makes in the D and E set because of the consistency of the data is slightly off. The example in D-06 shows one example.

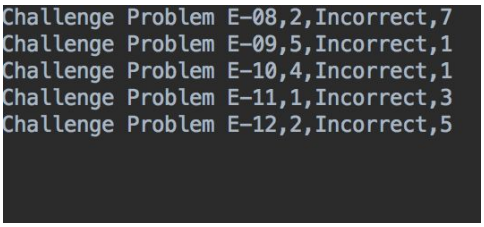


The problem results in a wrong answer because of the removal of the outer square. When calculating the pixels, it appears to have a flaw that does not give the right solution. The agent falls short on other problems faced by problem set D and E because of certain transformations. The agent could improve overall if I would of figured out a way to handle object recognition and had my agent continue learning.

Agent Performance:

```
Problem,Agent's Answer,Correct?,Correct Answer
Basic Problem B-01,2,Correct,2
Basic Problem B-02,5,Correct,5
Basic Problem B-03,1,Correct,1
Basic Problem B-04,3,Correct,3
Basic Problem B-05,4,Correct,4
Basic Problem B-06,5,Correct,5
Basic Problem B-07,6,Correct,6
Basic Problem B-08,6,Correct,6
Basic Problem B-09,5,Correct,5
Basic Problem B-10,3,Correct,3
Basic Problem B-11,1,Correct,1
Basic Problem B-12,1,Correct,1
Basic Problem C-01,3,Correct,3
Basic Problem C-02,4,Correct,4
Basic Problem C-03,4,Correct,4
Basic Problem C-04,8,Correct,8
Basic Problem C-05,3,Correct,3
Basic Problem C-06,8,Incorrect,7
Basic Problem C-07,4,Incorrect,2
Basic Problem C-08,3,Incorrect,5
Basic Problem C-09,3,Incorrect,2
Basic Problem C-10,7,Correct,7
Basic Problem C-11,4,Correct,4
Basic Problem C-12,8,Correct,8
Basic Problem D-01,3,Correct,3
Basic Problem D-02,2,Incorrect,1
Basic Problem D-03,3,Correct,3
Basic Problem D-04,2,Incorrect,1
Basic Problem D-05,7,Correct,7
Basic Problem D-06,3,Incorrect,1
Basic Problem D-07,1,Correct,1
Basic Problem D-08,3,Incorrect,4
Basic Problem D-09,1,Incorrect,3
Basic Problem D-10,6,Incorrect,1
Basic Problem D-11,3,Correct,3
Basic Problem D-12,6,Incorrect,3
Basic Problem E-01,1,Correct,1
Basic Problem E-02,7,Correct,7
Basic Problem E-03,5,Incorrect,2
Basic Problem E-04,8,Correct,8
Basic Problem E-05,5,Correct,5
Basic Problem E-06,8,Correct,8
Basic Problem E-07,1,Incorrect,3
Basic Problem E-08,2,Incorrect,1
Basic Problem E-09,7,Correct,7
```





As you can see from the images above, my agent has a hard time with some of the problems that it is faced with. I really struggled to handle pixels and specific transformations correctly within the project time-frame, however my agent handles some problems really well. The metrics used from previous problems were used for Project 3 as well.

Agents Relation to KBAI:

The same relation to KBAI applies to project 3 as in the first two projects, where the entire project's solution came specifically from each individual class lecture. The entire structure of the project remained fundamentally intact and continued to use Semantic Networks and Generate and Test. When designing my visual agent, I tried to related to human cognition in a very practical approach. As I previously stated earlier, I took the approach of solving every one of the problems before my agent solved them and then tried to build my agent visually to handle the groups of problems closely related using Generate & Test. I also used weighted transformations to process the best possible solutions as seen in lectures.

Agents Relation to Human Cognition:

Overall the design and performance tells us a lot about human cognition. It shows that the mind is very complex and continuously makes many decisions, interpretations and computations without us even being aware of it. While us humans can solve many Raven's Matrices problems almost instantaneously, an agent needs to break down every single transformation into smaller steps before attempting to solve the problem. This shows us that both humans and artificial intelligence agents think completely differently. However my agent tries to solve problems as I would solve the problem by looking at the changes from each of the figures then trying to find an answer that is closest in relation. The agent gives insight by handling the weights internally where as us humans use similar reasoning for picking out the best answer. When humans solve specific problems, they can relate each new problem faced from a previous problem. This agent is capable of solving problems that are closely related formed in groups of previously seen transformations similar to how a human would group them.