RPM Project: Milestone 1

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1 REASON THROUGH THE PROBLEMS ON RAVEN'S TEST

To find best fitting answer to the Raven's Progressive Matrix (RPM) based on the question in the basic and challenge problems, following steps can be taken to solve majority of the questions.

1.1 Selective addition/ subtraction of shapes

Seen in the Challenge problem C-02. With each row and column a square is being added. Going from top to bottom, one square is being added. Similarly, going from left to right,another square is being added. Answer can to that question is 5 squares in a straight line.
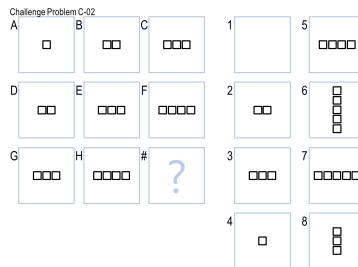

Figure 1—Challenge problem C-02. Source.

1.2 Constancy of the images horizontally/vertically

For Basic Problem D-01, there are all stars horizontally on the first row, figures changes vertically. First row has all star, second row has all heart, third row should have all hexagon hence the answer should be similar hexagon from that row. Figure 2 represents problem D-01.

1.3 Coming up with the shape by from missing/combining the piece from two rows/columns

Given in the Challenge Problem E-01, figure 3, shape in the last column is produced by from the non repetitive shape in the first two columns. In the first row, square is being repeated at top right side in figure A and figure B so we
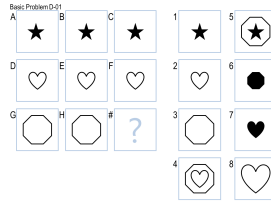
Figure 2—Basic problem D-01. Source.

remove that from the last image. Same with second row, square in the bottom left is being repeated so that will be excluded from the third row. For the last row, again the square on the top right is being repeated so the answer will have squares in the bottom (like a horizontal line.)
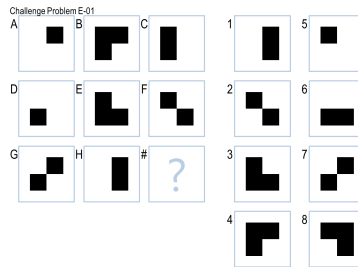

Figure 3—Challenge problem E-01. Source.

1.4 Reflective image of single shape or multiple shapes

Basic Problem B-05, has two shapes for each columns along reflective image of the shape in that row. Looking at A and C they both are reflective triangle of each other. For B and D it should be square as a reflective image. Which gives an answer as a square on the top left.
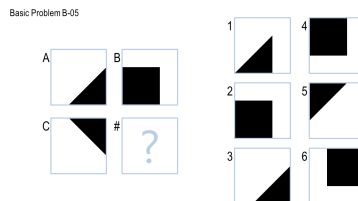

Figure 4—Basic problem B-05. Source.

2 MY APPROACH TO FEW PROBLEMS.

2.1 B-01

For Basic Problem B-01, seen in figure 5, a approach used is to compare the shapes in images for A and B, A and C, and B and C. If each pixel is identical to the shapes in images A to B, A to C, and B to C. The answer will also be identical to A, B, and C. Then look for the shape that matches A, B, and C from the given answer choice. The same logic was used to solve Basic Problem B-02.
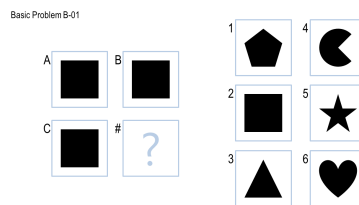

Figure 5—Basic problem B-01. Source.

2.2 B-03

For Basic Problem B-03, look at the shapes in images horizontally (A and B) and vertically (A and C). If each pixel of the image is identical for A and C (vertically). Then the answer will be identical to shape in image B. Another check done here was that A and B are reflections of each other. So the answer will be a reflection of C. The reflection of C should be identical to B. In the answer choice look for the shape that is identical to B and the reflection of C.
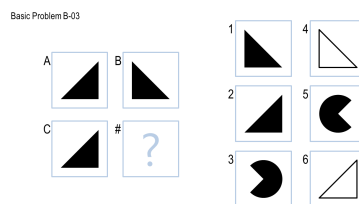

Figure 6—Basic problem B-03. Source.

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2.3 B-04

For Basic Problem B-04, there are multiple approaches. One of the common ones can be the reflection way to solve it. A and B are reflective image of each other. A and C are also reflective image of each other. Hence the answer should be reflective image of B or C which should be same answer.
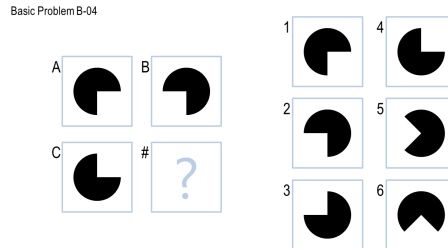

Figure 7—Basic problem B-04. Source.

3 DESIGNING AN AGENT TO APPROACH GIVEN PROBLEMS

Humans design/create the models that can act like human. Which is how exactly I plan to develop my agent teaching specific tricks at given time and practicing the learning tricks. Starting by learning the easy problems and gradually increasing the difficulty level. For example starting with basic 2x2 problem then going to challenging 2x2 problems then basic 3x3 problems and challenging 3x3 problems so on and so forth. Using the semantic network method to solve the problems by defining the relation between the given objects. For the agent to remember the solved problem allocating memory to store the solved and unsolved problems is also integral part to designing the agent. Technically I want my agent to look at the image and apply all the rules that are listed in section one. Which is to follow selective addition/ subtraction of shapes, constancy of the images horizontally/vertically, coming up with the shape from missing/combining the piece from two rows/columns, and reflective image of single shape or multiple shapes.

4 BIGGEST CHALLENGES IN DESIGNING THE AGENT

Designing human like agent will not be easy at all. There are lots of challenges both technically and theoretically. Following are some of the major challenges.

4.1 Having limited knowledge about creating the Artificial Intelligent (AI) agent

Prior to this class I have no experience with any of the concepts to design human based agent. Teaching the techniques to fellow humans may make it easy by combing speech and actions. Breaking down the thought process and creating into steps for computers to follow might be challenging.

4.2 Solving the problem that has more than one correct answer

Already having limited amount of knowledge is difficult enough to select one right answer. Selecting all the possible answers for the given problem with limited knowledge can be more challenging.

4.3 Looking into the memory

For agent to look into memory to see if it has already solved similar kind of problem and trying to solve the problem. In contrast with agent has not seen the given problem and trying to solve/skip it can be challenging.