**Jigsaw Puzzle Solver Project Overview**

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Solving a jigsaw puzzle entails arranging a fixed set of pieces such that they reconstruct an original source image. With a traditional jigsaw puzzle, there are two primary factors that significantly reduce the difficulty of the problem namely:

1. Piece Shape – Due to different piece shapes, most pieces are mechanically unable to be placed adjacent to one another. What is more, through shape alone, the approximate location of some pieces can be known (e.g. corner pieces).
2. Knowledge of the Source Image –

Deliverables

1. **Jigsaw Puzzle Generator**
   1. *Predicted Duration:* 2 to 3 Weeks
   2. *Description:* Given a source image, the tool will:
      1. Import a bitmap image
      2. Parse the image into a specified number of equal size images (note some of the picture may be cropped during this process
      3. Perform a Fisher-Yates shuffle of the pieces
      4. Optionally randomly rotate each piece
      5. Display the shuffled image (with optional boards for clarity)
   3. *Goals:* I have never worked with image processing in the past. This will provide me experience working with image files. What is more, the quality of jigsaw solution may be subjective. The ability to visualize that image is expected to provide clear insight into the strengths and weaknesses of an approach and how it may be improved.
   4. *Programming Language:* Python with most likely the Pillow Library
2. **Top-down versus Bottom Up Solution Comparison**
   1. *Predicted Duration:* 2 weeks
   2. *Description:* There are multiple approaches that have and can be used to solve this problem including: genetic algorithm, neural networks, local beam search, constraint satisfaction, etc. We classify these solutions into two primary categories namely:
      1. Bottom-Up: Start with a single piece and grow the solution one piece at a time. This is the approach used by humans when solving the problem.
      2. Top Down: Start with a fully placed board and optimize the solution by transposing pieces or sets of pieces.

From a tertiary view of the literature,

1. **Jigsaw Puzzle Result Evaluation Metric Identification and Comparison**
   1. *Predicted Duration:* 1 to 2 weeks
   2. *Description:* The quality of the solution to the jigsaw puzzle problem is
2. **Solution Implementation**
   1. *Predicted Duration:* 1 to 2 weeks
   2. Description: The quality of the solution to the jigsaw puzzle problem is
3. **CS298/CS299 Project Proposal**
   1. Approximate Duration: 2 to 3 weeks. However, it is anticipated that work on this task will be done throughout the semester.
   2. Description: This is the culminating document for this semester’s activities. It will include:
      1. An overview of the project problem
      2. Summary of previous work and solutions of the problem
      3. Discuss the strategies I plan to use to solve the problem