Weekly Report – Content-Aware Image Resizing Using Seam Carving

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IMPLEMENTATION OF ENERGY MAP

This week, we have started implementing the gradient-based energy function, as defined in the base paper. We used the Sobel operator to compute the partial derivatives $\partial I/\partial x$ and $\partial I/\partial y$. These gradients were then combined to create the pixel importance map.
We generate various energy maps for different image types — including portraits, structural scenes, and natural landscapes — to visually analyze the differences in edge distribution and confirm that high-contrast regions correspond to high energy.

DYNAMIC PROGRAMMING CUMULATIVE MAP

We also implemented the dynamic programming matrix $M(i, j)$ to calculate the minimum energy cost for each seam. This enabled us to propagate energy from the top to the bottom, while minimizing seam value globally rather than locally.
We then verified the DP correctness using numerical grid visualization and confirmed that the seam cost calculation is in line with theoretical expectations.

INITIAL TESTING USING RETARGETME DATASET

We performed initial seam calculation experiments on different image categories from the RetargetMe dataset. These experiments helped us determine that the natural landscape images were more seam-friendly compared to structured images.

CHALLENGES ENCOUNTERED

- Index boundary errors temporarily caused discontinuous seam paths.

- Incorrect parent-pointer tracking led to broken seams before debugging.
- Significant variation in seam placement depending on the density of the texture of the image.

TASKS PLANNED FOR NEXT WEEK

- Implement path backtracking and seam removal operation.
- Experiment with seam insertion for enlargement.
- Add visualization overlays to examine seam distribution patterns.
- Begin performance analysis on multiple sample images.