

Paper Summary - GANzzle

GANzzle Architecture:

- 1) Multi-encoder single-decoder architecture: Each puzzle piece is encoded separately, and the encodings are then combined and decoded to reconstruct the complete image.
- 2) GAN-based image generation: GANs are used to generate the complete image from the encoded puzzle pieces. The generator network creates the image, and the discriminator network provides feedback to ensure the generated image is realistic.

Learning Global Solution:

- 1) Piece Encoding: Puzzle pieces are passed through encoder networks to obtain their embeddings. These embeddings capture the features of each piece.
- 2) Image Reconstruction: The generator network takes the combined embeddings of all pieces and reconstructs the complete image. The reconstruction is refined by the discriminator network to ensure the generated image looks realistic.

Piece Assignment:

- 1) Similarity Matrix: GANzzle constructs a similarity matrix between the embeddings of puzzle pieces and the target slots in the generated image. This matrix represents the similarity between each piece and each target slot.
- 2) Optimization with Hungarian Attention: Hungarian attention is used to optimize the assignment of pieces to target slots. It dynamically attends to relevant information in the similarity matrix to determine the best assignment.

Evaluation:

- 1) GANzzle is tested on two large-scale datasets, PuzzleCelebA and PuzzleWikiArts, for various puzzle sizes.
- 2) It achieves competitive performance compared to existing deep learning methods, demonstrating its effectiveness in solving puzzles of different sizes.
- 3) GANzzle shows robustness in handling missing, noisy, and eroded puzzle pieces, highlighting its versatility and applicability.

Findings:

- 1) GANzzle offers a novel perspective on jigsaw puzzle solving by combining generative adversarial methods with dynamic assignment mechanisms.
- 2) It provides a scalable solution that can handle puzzles of different sizes and challenging scenarios.
- 3) By reframing the problem as a retrieval task, GANzzle overcomes limitations of traditional methods and achieves state-of-the-art performance in puzzle solving.

Tiny-image set 64*64 images: 1000 labels