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# GANIFY: IMAGE MANIPULATION USING GAN

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## ABSTRACT

This paper presents **GANify**, an interactive image editing framework leveraging Generative Adversarial Networks (GANs). Users can manipulate images by selecting and dragging points to desired positions, enabling fine-grained control over attributes like pose, shape, and expression across various object categories. GANify integrates **motion supervision** for precise transformations and **point tracking** to maintain accuracy. Operating within the GAN manifold ensures realistic edits, even in complex scenarios. Additionally, GANify supports real-image editing via **GAN inversion**. Experimental results show its superior flexibility and precision over existing methods, making it a powerful tool for interactive image manipulation.

**Keywords:** Generative Adversarial Networks (Gans), Image Editing, Motion Supervision, Point Tracking, GAN Inversion.

## I. INTRODUCTION

Generative Adversarial Networks (GANs) have transformed digital image manipulation by enabling high-quality, AI-driven enhancements. GANify is an advanced image-manipulating platform that leverages GANs to perform complex tasks such as style transfer, face aging, and photorealistic image generation. Unlike traditional tools, GANify integrates creative freedom with technical precision, allowing users to modify fine details like facial expressions or apply artistic transformations. Designed for accessibility, GANify supports automatic enhancements like denoising, colorization, and upscaling, making it a valuable asset for photographers and designers. Its applications extend to film production, game development, and digital marketing, where high-quality visuals are crucial. GANify offers an innovative solution that enhances efficiency and creativity in image manipulation.

## II. LITERATURE REVIEW

[1] Enables precise GAN-based image manipulation by dragging points, using motion supervision and tracking to provide fine control over pose, shape, and expression modifications. [2] Utilizes text descriptions aligned with segmentation masks to perform accurate and context- aware GAN-driven image editing, enhancing precision and coherence in modifications. [3] Integrates residual learning and self-attention mechanisms to refine image generation and recognition, ensuring better feature weighting and improved synthesis quality. [4] Leverages GANs to restore sharp details in blurry images, effectively preserving textures and fine structures while surpassing traditional deblurring techniques. [5] Employs NeuralODEs to model smooth and continuous transformations within GAN latent space, allowing seamless image morphing and precise attribute adjustments.

## III. PROPOSED SYSTEM

The proposed GANify system harnesses the power of Generative Adversarial Networks (GANs) to enable exact and user-friendly image manipulation. Utilizing a pre-trained GAN's latent space ensures realistic transformations while allowing fine-grained edits through a point-based control mechanism. Advanced motion supervision and point-tracking techniques refine these transformations, ensuring accuracy and smooth, natural modifications. GANify features an intuitive graphical user interface (GUI) to enhance usability, enabling users to perform real-time, seamless edits. This comprehensive approach makes GAN-based image manipulation efficient and versatile.

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### A. ARCHITECTURE

The proposed architecture enables precise and interactive image editing using GANs. Users upload images and define manipulation points via a User Input Module, which forwards requests to the Interactive Manipulation System. This system coordinates with a pre-trained Generative model to produce realistic edits. Modified images are displayed to the user in real time and stored in an Image Database for future use. A Manipulation Parameters Store saves editing parameters for undo operations or further modifications. This architecture ensures seamless interaction, precise control, and realistic image outputs.

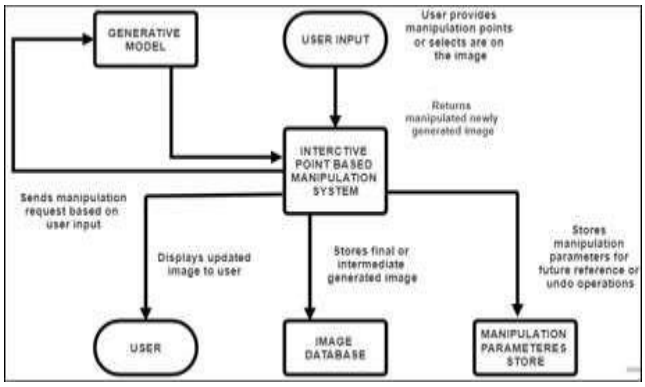


**Fig. 3.1:** Workflow of GANify

### B. CNN ALGORITHM

**User Input Collection**: The user selects handle and target points via the UI and optionally specifies a region of interest using a mask.

**Image Retrieval:** A GAN-generated or stored image is retrieved for manipulation.

**Motion Supervision:** A loss function drives handle points toward target positions, supervised by feature maps from the GAN generator.

**Point Tracking:** Handle points are updated iteratively using nearest-neighbor search in the GAN's feature space for accuracy.

**Image Update:** The image is modified based on the updated latent code once handle points align with target positions.

**Display Results:** The modified image is presented to the user for further input or finalization.

**Point-based Manipulation:** This module enables users to edit images by selecting and moving specific points interactively. Each selected point, known as a handle point, can be dragged to a new position, and the system updates the image accordingly. This method allows for highly controlled modifications, such as adjusting facial expressions, reshaping objects, or altering poses, while maintaining realism.

**Motion Supervision:** To ensure smooth and natural transformations, motion supervision is applied through a feature-based loss function. This loss function guides the movement of the handle points toward their target positions while preserving structural integrity. By leveraging feature maps from the GAN's generator,

the system ensures that deformations appear realistic and coherent rather than distorted or unnatural.

**Point Tracking:** Accurate point tracking is crucial for precise edits. This module continuously updates the position of handle points by performing a nearest- neighbor search in the GAN's feature space. The system prevents artifacts and ensures smooth edits by tracking how points shift during the transformation process. This is particularly useful for adjusting facial expressions or repositioning objects while maintaining high fidelity.

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## IV. RESULT

### A. Comparison Of Input and Output

**Input Handle Points Manipulated Image**

**Fig. 4.1** Initial Handle Points VS Target Points

**RESULT ANALYSIS**

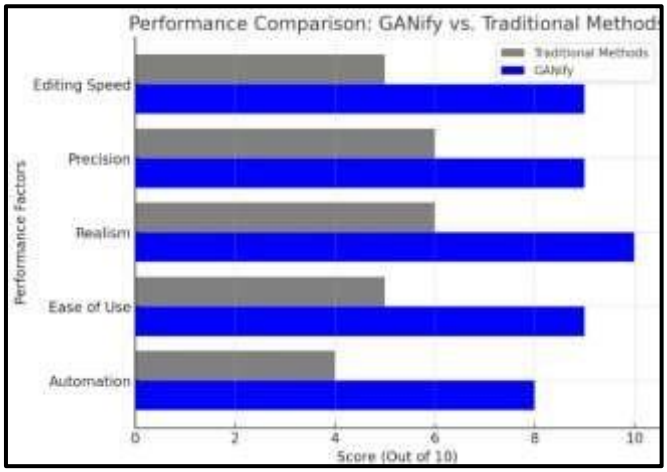


**Fig 4.2.1** Comparison between GANify and Traditional Method

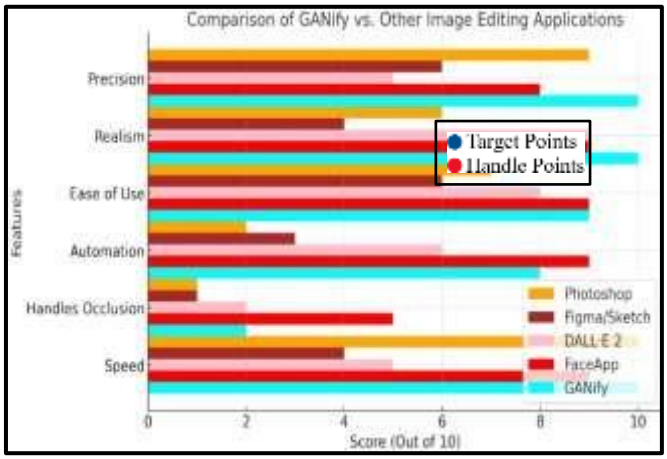


**Fig 4.2.2** Comparison between GANify and Other Image Editing Applications

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## V. CONCLUSION

GANify is an interactive point-based image manipulation framework that offers precise and flexible control over GAN-generated images. It integrates motion supervision with feature-based point tracking to achieve accurate deformations while maintaining high realism. Experimental evaluations demonstrate its superior performance over existing methods in both qualitative and quantitative analyses. The framework enables real-time, user-guided editing, making it valuable for image synthesis and content creation. Future work will focus on extending GANify to 3D generative models and improving control over complex transformations while preserving realism.

## VII. FUTURE SCOPE

**3D Generative Models** – Extend GANify to support 3D-aware image synthesis.

**Real-World Image Editing** – Improve GAN inversion for better manipulation of real images.

**Enhanced Point Tracking** – Develop more accurate tracking mechanisms for complex scenes.

**Real-Time Optimization** – Reduce computational overhead for seamless interactive editing.

**AI-Driven Automation** – Integrate intelligent suggestions for easier user interaction.

**Ethical Considerations** – Address bias and prevent misuse in generative models.

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