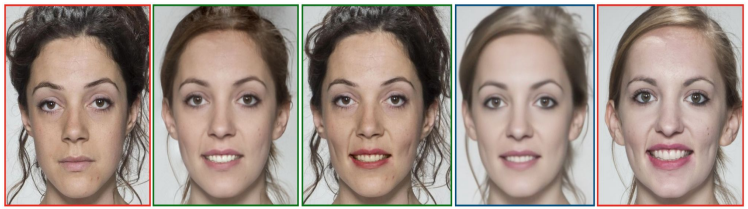
Neural Implicit Morphing of Face Image

What is the problem?

Problem: Face morphing is a challenging task in computer graphics due to variations in pose, lighting, gender, and ethnicity.

Goal: This project introduces a novel method for **neural implicit morphing** of face images, using **coord-based neural networks** to achieve seamless transitions between face images.



What has been done earlier?

Traditional Techniques:

Early methods used **landmark-based** approaches for feature alignment followed by blending.

Techniques like **thin-plate splines** and **cross-dissolves** were popular, but often led to distortions and artifacts when applied to complex images.

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What novel solution proposed by the authors to solve the problem?

Neural Implicit Morphing:

The method leverages coord-based neural networks for smooth feature alignment and blending.By embedding warping and blending in a single neural network, the system achieves a seamless transition between images without traditional discretization.

Key Features of the System

Time-Dependent Neural Warping: Allows continuous alignment of images over time.

Smoothness: Neural networks are smooth in both **space** and **time**, allowing **closed-form derivatives** to constrain the deformation and ensure minimal distortion.

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Advantages Over Traditional Methods

- **No Interpolation Needed**: Neural networks allow for **continuous morphing** without the need for pixel-level interpolation.
- **High Aesthetic Quality**: The resulting morphed images are visually smoother and more accurate than those generated by previous approaches.

Applications

- **Artistic**: Creative applications in **digital art** and **film production**.
- **Forensic**: Detecting **morphing attacks** in biometric systems (e.g., passport photos).
- **Surveillance**: Generating datasets to enhance the detection of **face-morphing attacks** in public security systems.

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