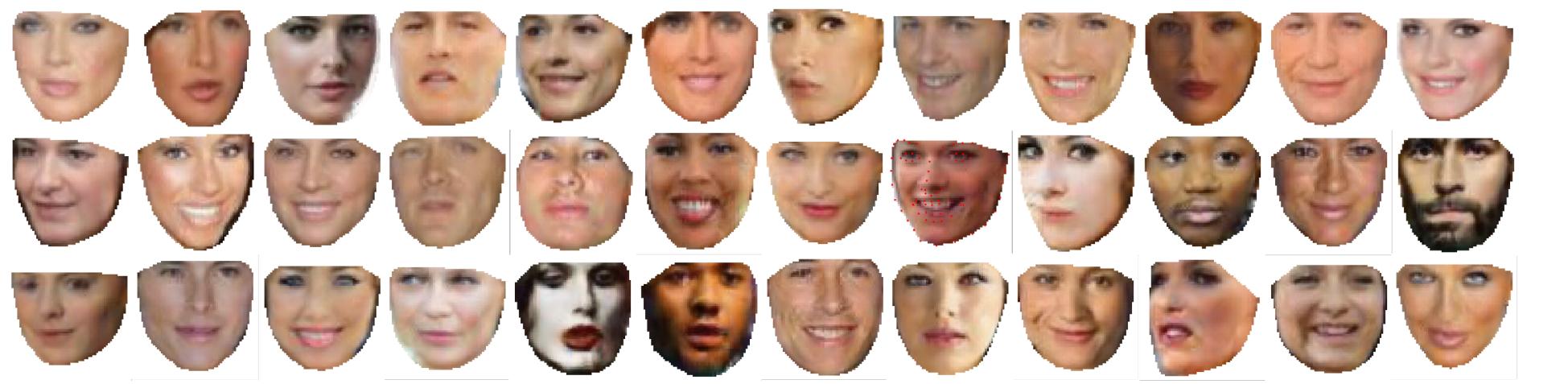
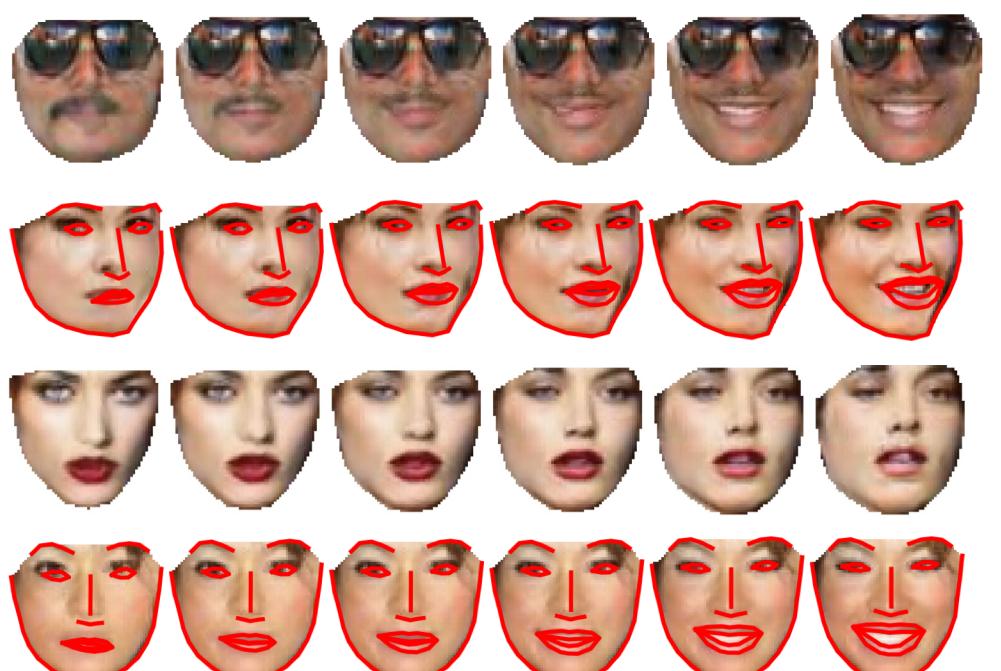


GAGAN: Geometry-Aware Adversarial Networks

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- Apart from the visual texture, the visual appearance of objects is significantly affected by their shape geometry, information which is not taken into account by existing generative models.
- Geometry-Aware Generative Adversarial Network (GAGAN) incorporate geometric information into the image generation process.
- The generator samples latent variables from the probability space of a statistical shape model.
- By mapping the output of the generator to a canonical coordinate frame through a differentiable geometric transformation, we enforce the geometry of the objects and add an implicit connection from the prior to the generated object



(a) Shape prior

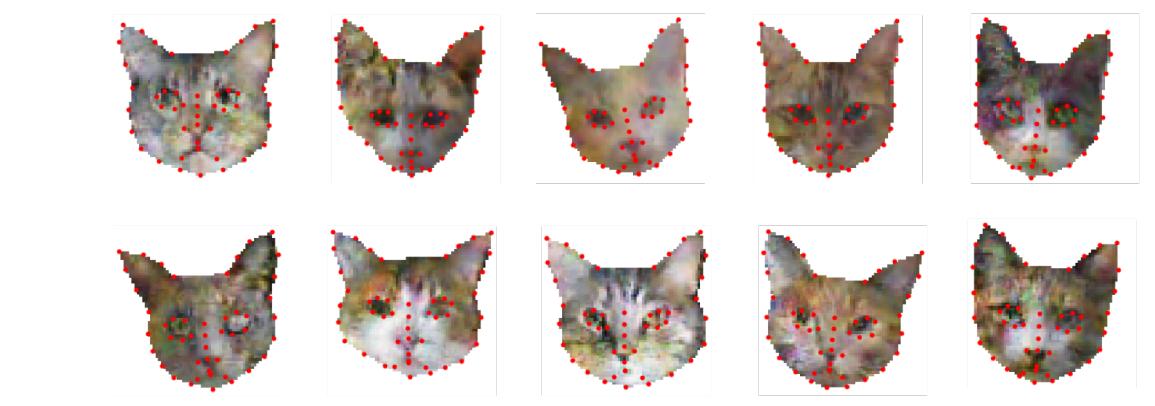
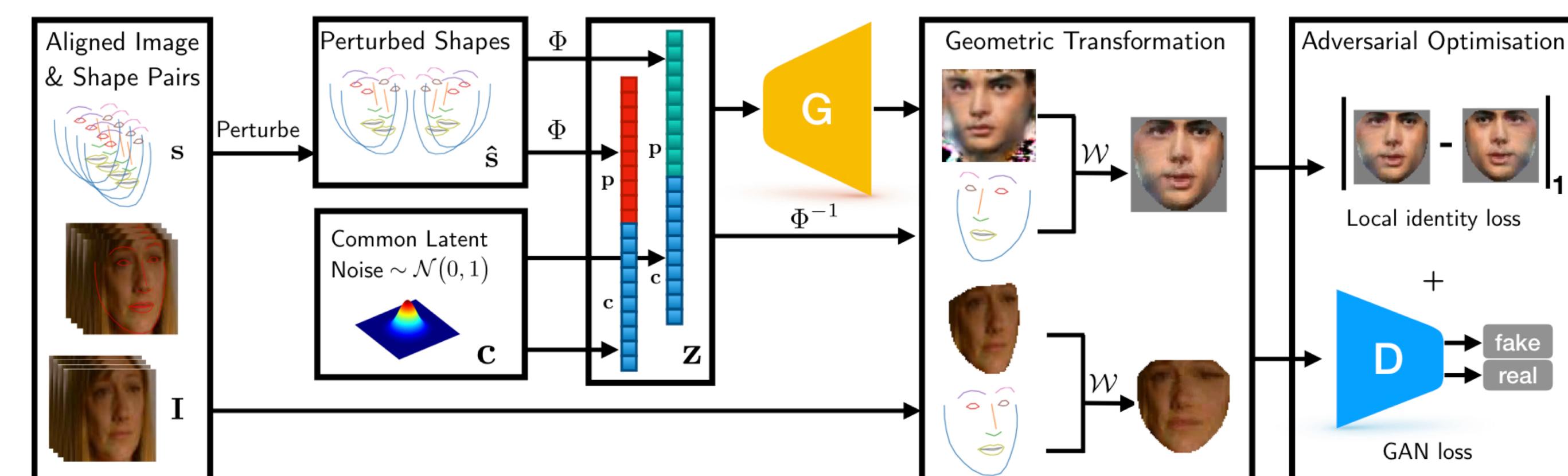
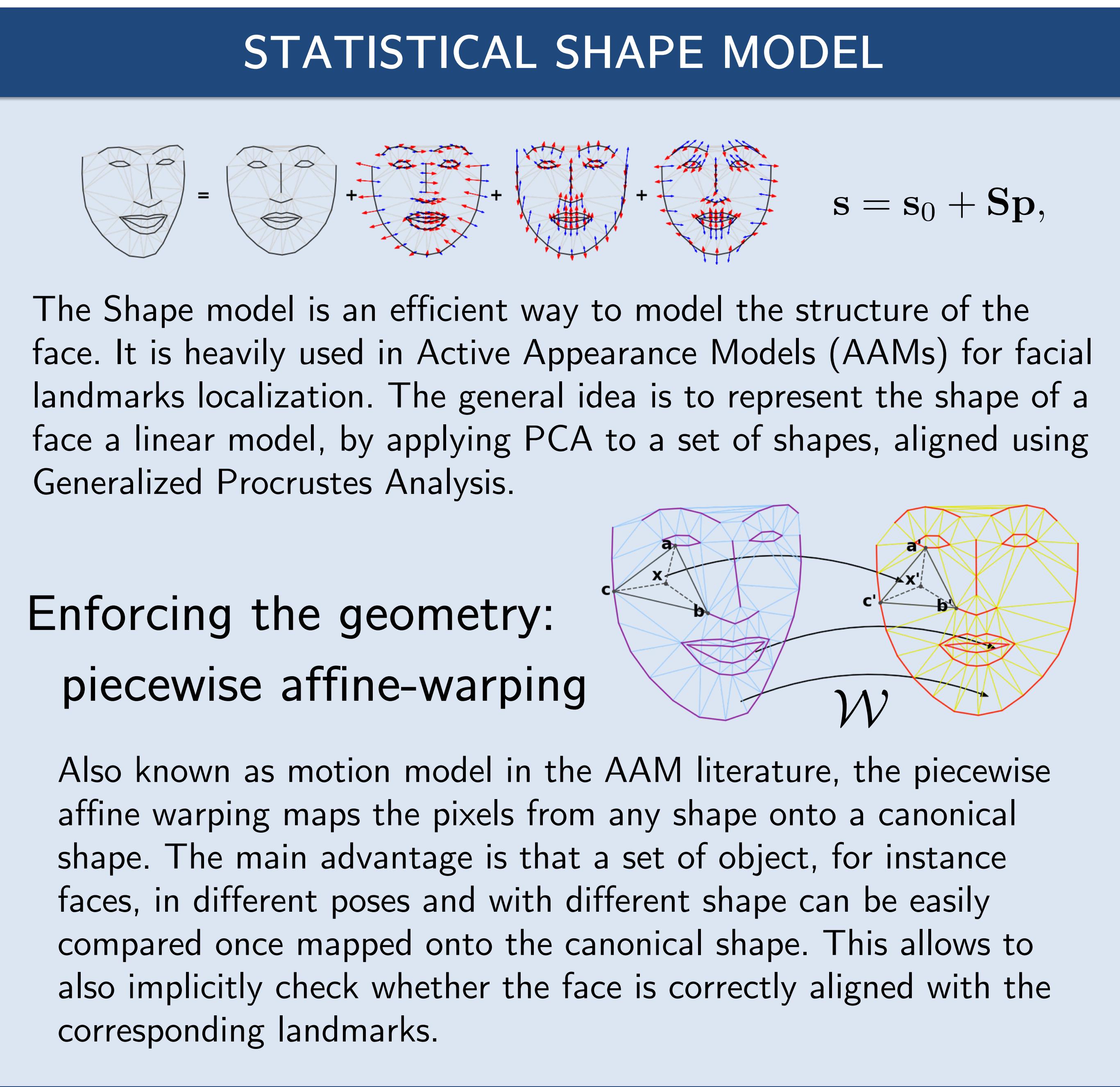


b) Appearance prior

OBJECTIVE FUNCTION

$$\min_G \max_D V(D, G) = \mathbb{E}_{\tilde{\mathbf{I}} \sim P_{data}} [\log D(W(\tilde{\mathbf{I}}, \tilde{\mathbf{s}}))] + \mathbb{E}_{\tilde{\mathbf{z}} \sim \mathcal{N}(0, 1)} [\log(1 - D(W(G(\tilde{\mathbf{z}}), \tilde{\mathbf{s}})))] + \lambda \cdot LAP$$

$$LAP = \ell_1 \left(\mathcal{W}(G(\hat{\mathbf{z}}), \hat{\mathbf{s}}), \mathcal{W}(G(\hat{\mathbf{z}}_M, \hat{\mathbf{s}}_M)) \right)$$



GAGAN works on small datasets (less than 400 images)

