

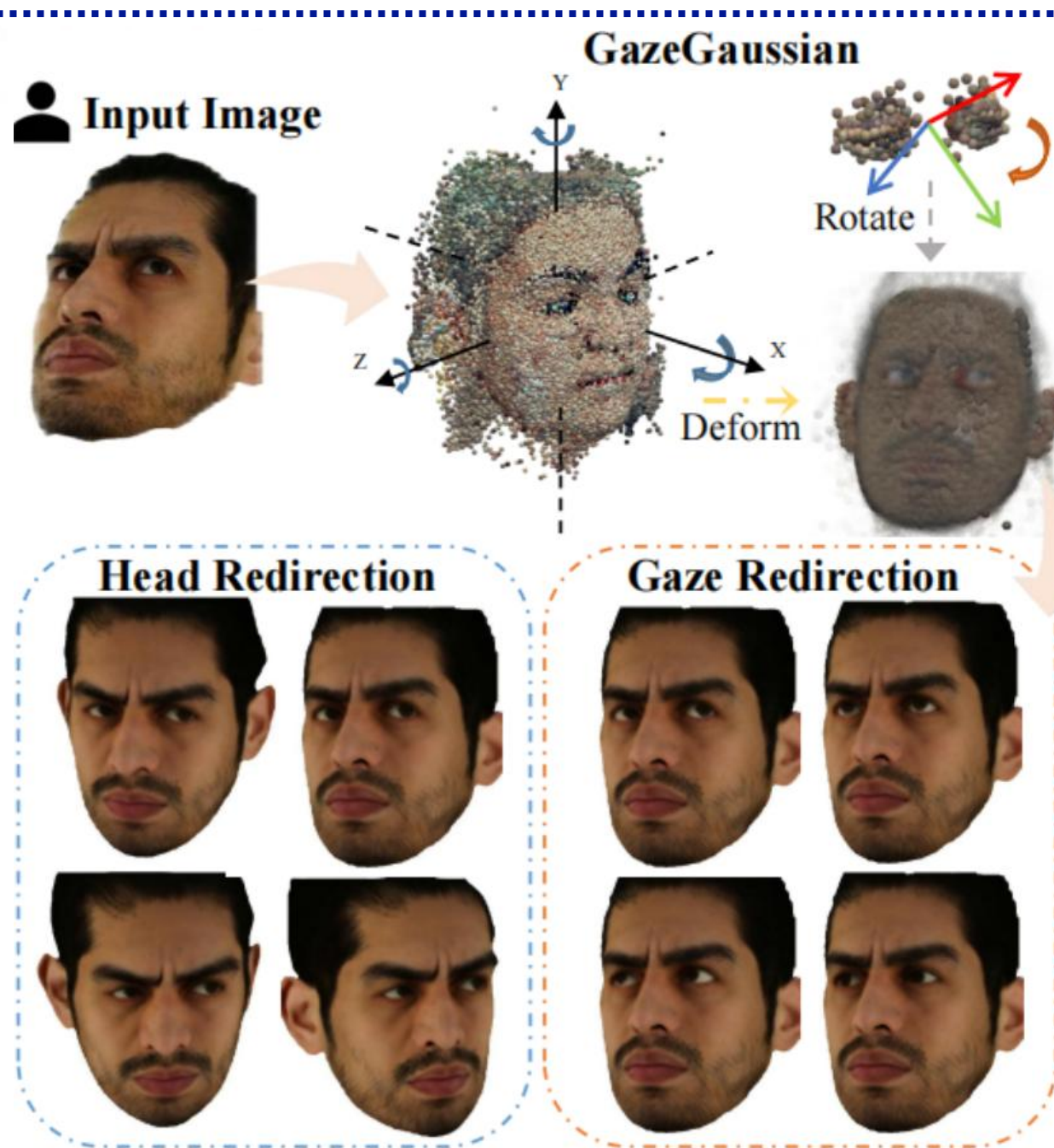
基于三维高斯的高保真视线重定向方法

GazeGaussian: High-Fidelity Gaze Redirection with 3D Gaussian Splatting

韦小宝, 陈鹏, 李广宇, 陆鸣, 陈辉, 田丰

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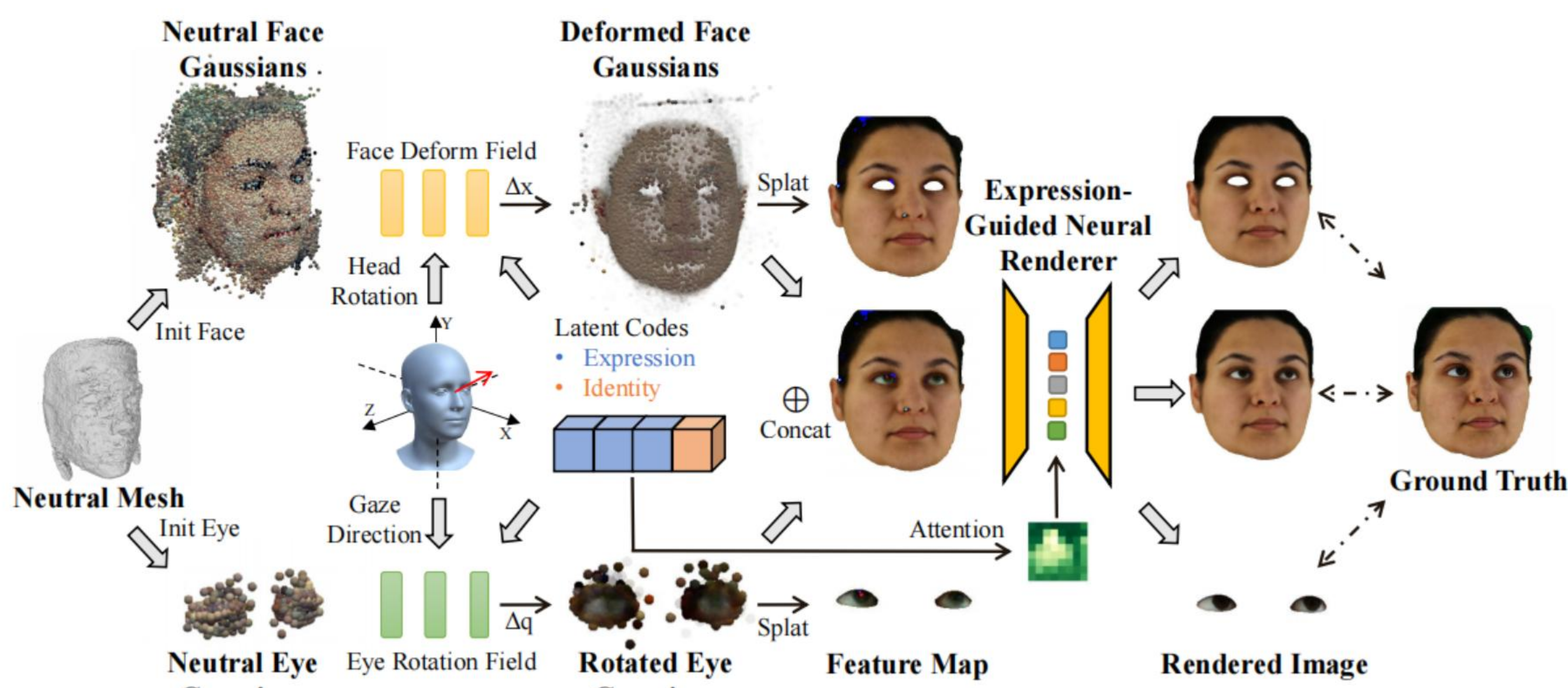
代码: <https://github.com/ucwxb/GazeGaussian>
 联系方式 (韦小宝, weixiaobao0210@gmail.com)



已有人脸渲染方法存在以下局限:

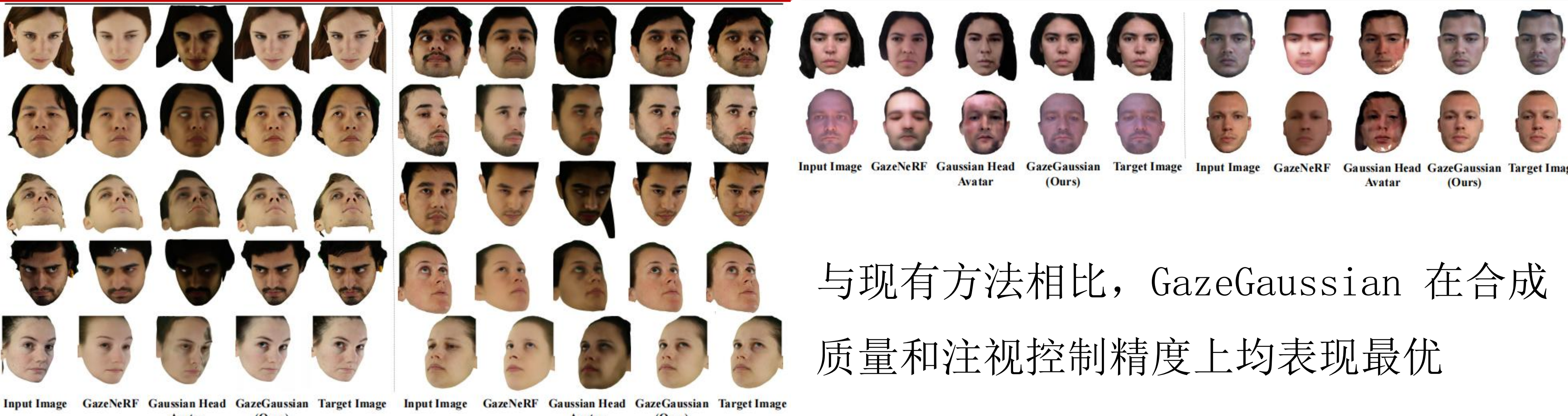
- 视线角度控制不精确:** 许多方法仅通过隐式引导改变凝视方向, 缺乏物理约束或显式几何机制。
- 泛化能力差:** 模型往往需要为每个用户训练特定网络, 或依赖大量个体数据。在跨个体、跨场景的重定向任务中, 身份保持差、个性特征丢失。
- 训练效率低, 难以部署:** NeRF类方法训练时间长

关键问题: 在视频通信、虚拟人互动等人机交互场景中, 准确且高保真的视线合成是提升沉浸感与自然度的关键



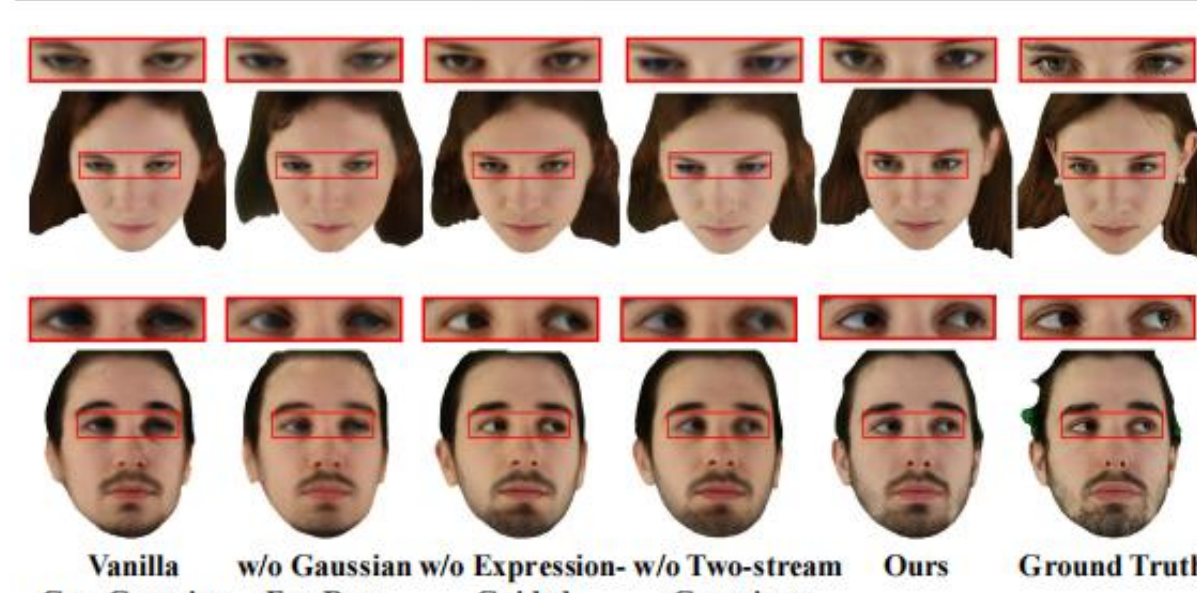
我们提出了首个基于高斯点双支路建模的视线可控三维人脸表达方法GazeGaussian, 支持面部表情与注视方向的独立建模与编辑。它显式划分眼部与面部区域, 分别建模眼球与面部, 并结合视线向量引导高斯旋转, 实现精准 视线重定向。

Method	ColumbiaGaze							MPIIFaceGaze				GazeCapture								
	Gaze↓	Head Pose↓	SSIM↑	PSNR↑	LPIPS↓	FID↓	Identity Similarity↑	Gaze↓	Head↓	LPIPS↓	ID↑	Gaze↓	Head↓	LPIPS↓	ID↑					
STED	16.217	13.153	0.726	17.530	0.300	115.020	24.347	18	17.887	14.693	0.413	6.384	14.796	11.893	0.288	10.677	15.478	16.533	0.271	6.807
HeadNeRF	12.117	4.275	0.720	15.298	0.294	69.487	46.126	35	15.250	6.255	0.349	23.579	14.320	9.372	0.288	31.877	12.955	10.366	0.232	20.981
GazeNeRF	6.944	3.470	0.733	15.453	0.291	81.816	45.207	46	9.464	3.811	0.352	23.157	14.933	7.118	0.272	30.981	10.463	9.064	0.232	19.025
Gaussian Head Avatar	30.963	13.563	0.638	12.108	0.359	74.560	27.272	91	10.939	3.953	0.347	46.183	12.021	8.530	0.295	30.932	11.571	7.664	0.295	22.236
GazeGaussian (Ours)	6.622	2.128	0.823	18.734	0.216	41.972	67.749	74	7.315	3.332	0.273	59.788	10.943	5.685	0.224	41.508	9.752	7.061	0.209	44.007

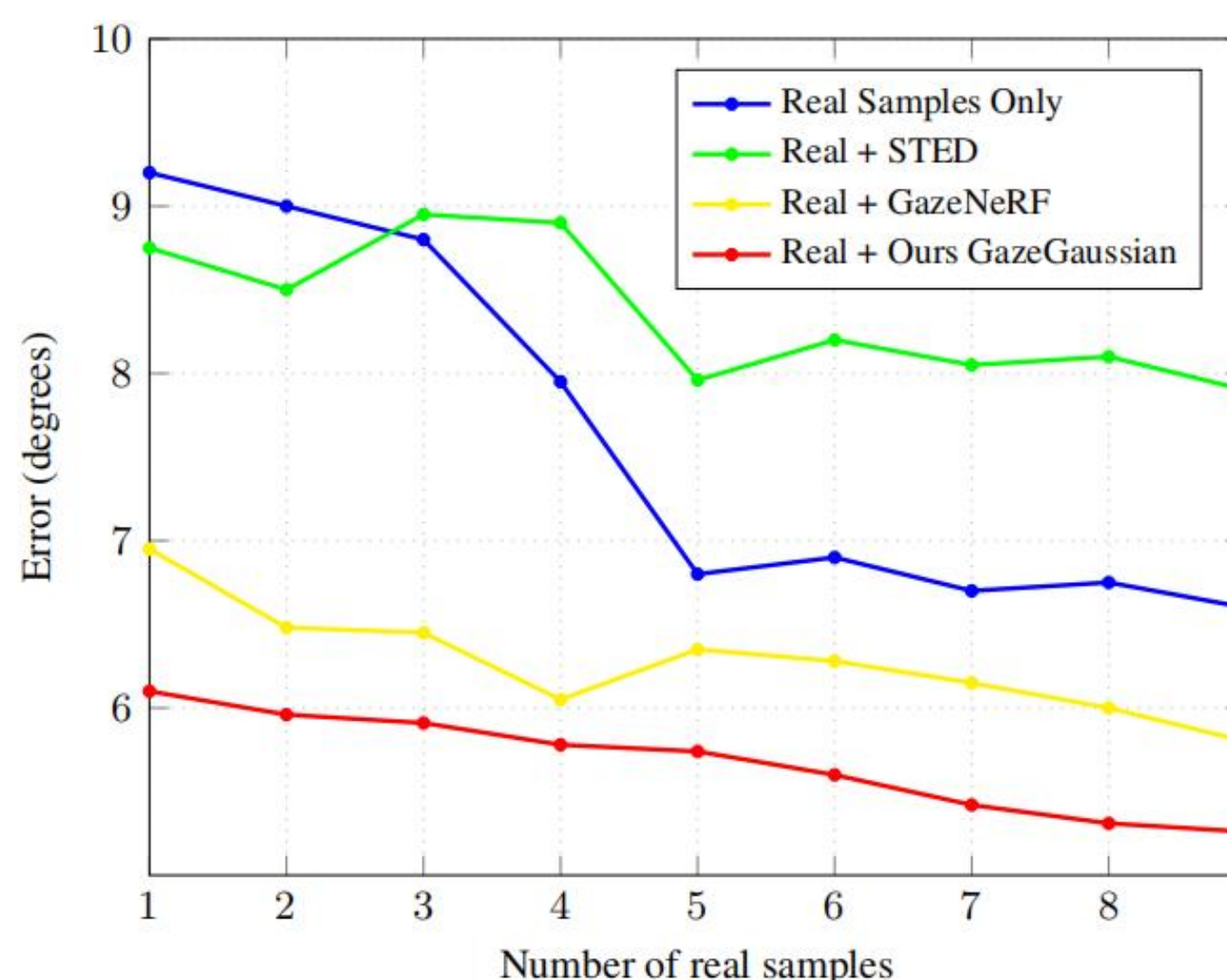


与现有方法相比, GazeGaussian 在合成质量和注视控制精度上均表现最优

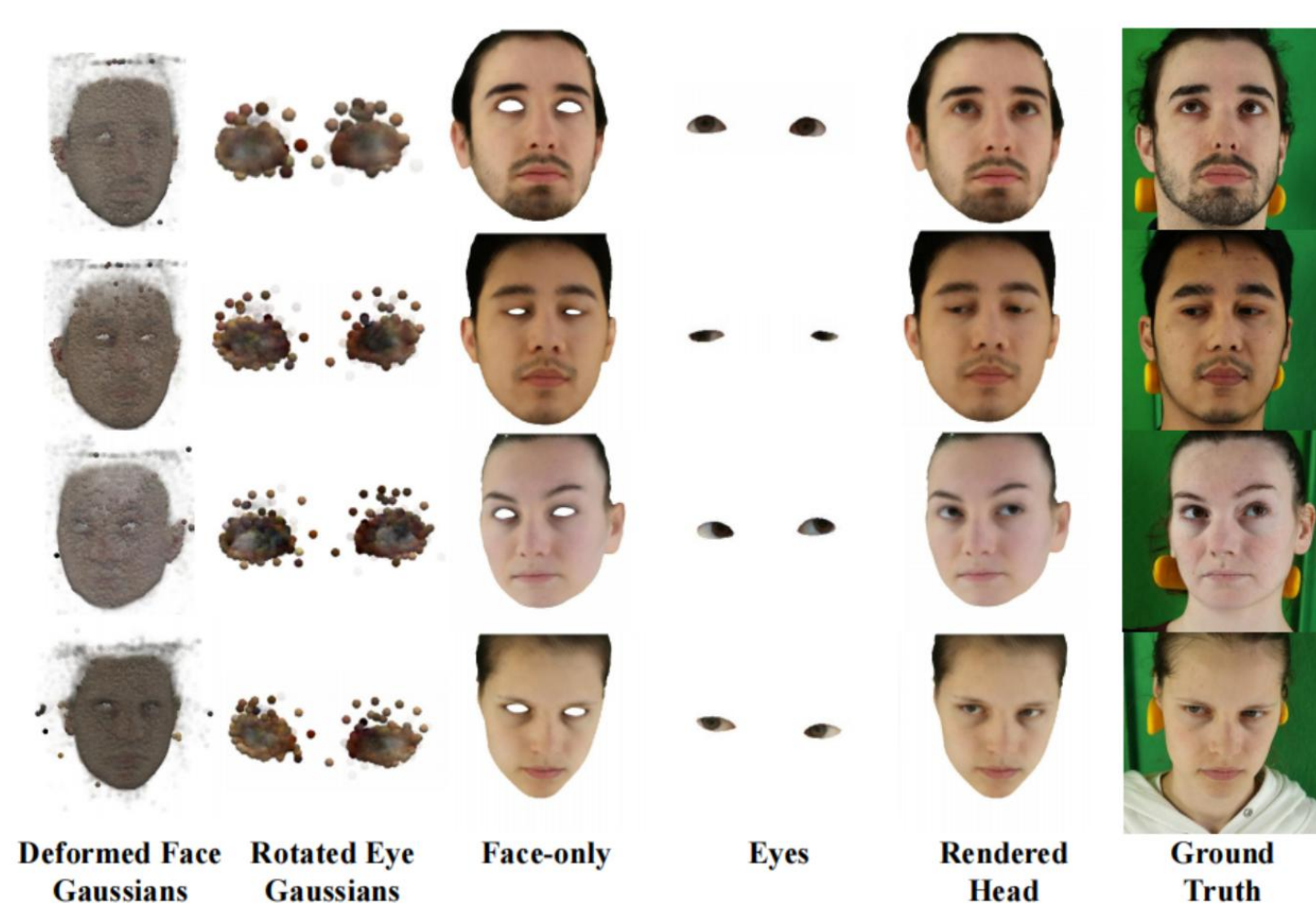
Two-stream	Gaussian Eye Rep.	Expression-Guided	Gaze↓	Head Pose↓	SSIM↑	PSNR↑	LPIPS↓	FID↓	Identity Similar
✓	✓	✓	13.651	2.981	0.753	16.376	0.272	55.481	38.94
✓	✓	✓	13.489	3.149	0.751	16.365	0.274	54.327	41.52
✓	✓	✓	8.883	2.655	0.766	16.692	0.254	48.391	45.01
✓	✓	✓	7.894	3.098	0.769	16.873	0.250	49.658	46.15
✓	✓	✓	6.622	2.128	0.823	18.734	0.216	41.972	67.74



消融实验



提高视线预测模型能力



变形三维高斯可视化