

Documents

Azemin, M.Z.C.^a, Tamrin, M.I.M.^b, Hilmi, M.R.^a, Kamal, K.M.^c

Assessing the Efficacy of StyleGAN 3 in Generating Realistic Medical Images with Limited Data Availability
(2024) *ACM International Conference Proceeding Series*, pp. 192-197.

DOI: 10.1145/3651781.3651810

^a Department Of Optometry And Visual Science, Kulliyah Of Allied Health Sciences, International Islamic University, Malaysia

^b Kulliyah Of Ict, International Islamic University, Malaysia

^c Department Of Ophthalmology, Kulliyah Of Medicine, International Islamic University Malaysia, Malaysia

Abstract

In this study, we leveraged StyleGAN 3 to synthesize high-fidelity images of pterygium, achieving significant strides in image realism as evidenced by low Fréchet Inception Distance (FID) scores. Our results demonstrate that StyleGAN 3 can intricately capture the textural nuances and vascular patterns distinctive to pterygium, with color tones and variations that closely mirror clinical photography. The generated images exhibit high equivariance to transformations, retaining their realism under various manipulations. Clinician reviews, expressed through confusion matrices, validated the authenticity of the synthetic images, although variations in individual assessments highlighted the challenges in differentiating between generated and real images. Ultimately, our findings confirm the efficacy of StyleGAN 3 in producing synthetic medical images that could potentially expand datasets for medical research and training, while also underscoring the necessity for diversity in training data and model tuning to achieve optimal realism. © 2024 ACM.

Author Keywords

Generative adversarial network; limited data; pterygium images

Index Keywords

Color photography, Medical imaging; Color tone, Color variations, Confusion matrix, Data availability, Equivariance, Fréchet, High-fidelity images, Limited data, Pterygium image, Vascular patterns; Generative adversarial networks

Correspondence Address

Azemin M.Z.C.; Department Of Optometry And Visual Science, Malaysia; email: zulfaezal@iiu.edu.my

Publisher: Association for Computing Machinery

Conference name: 13th International Conference on Software and Computer Applications, ICSCA 2024

Conference date: 1 February 2024 through 3 February 2024

Conference code: 199911

ISBN: 9798400708329

Language of Original Document: English

Abbreviated Source Title: ACM Int. Conf. Proc. Ser.
2-s2.0-85195426346

Document Type: Conference Paper

Publication Stage: Final

Source: Scopus