

Borysenko D. Generation Capabilities of Artificial Intelligence: In Search of Optimization / D. Borysenko // Smart Technologies for an All-Electric Society. STE 2025. Proceedings of the 22nd International Conference on Smart Technologies & Education (STE2025).- Springer, Cham, 2026. - Volume 2. - Pp 15-27.

**Abstract** Today, the development of artificial intelligence (AI) is at a turning point, characterized by its high level of generative capabilities that are transforming both industries and research. From text generation to natural language processing, from image generation to high-quality video content creation and beyond, AI models demonstrate extraordinary proficiency in generating powerful results. However, the pursuit of optimization remains a pressing challenge: whether it is accuracy, efficiency, or ethical considerations. This paper explores the current state of AI capabilities, focusing on optimization strategies, intrinsic limitations, and future trajectories. Additionally, the interplay between computational efficiency, model interpretability, and societal impact is discussed. By exploring recent research and advances, this article aims to provide a comprehensive overview of the field and identify avenues for further improvement.

**Keywords** Artificial intelligence · Generative models · Optimization · Machine learning · Ethical AI