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Impact of AI-Generated Content on AI Technology: Exploring Model Collapse and Its Implications

Elfindah Princes

Information Systems Management Department, BINUS Graduate Program – Master of Information Systems Bina Nusantara University, Jakarta, Indonesia, 11480

Abstract: *Purposes - This research aims to investigate the phenomenon of "model collapse" within Generative Adversarial Networks (GANs) when AI models are trained using AI-generated content. The study focuses on understanding the implications of model collapse on the quality of AI outputs, exploring new concepts like "Model Autography Disorder" (MAD) and "Habsburg AI," and discussing the broader ethical and social impacts of AI self-consumption. Methodology - The study utilizes a mixed-methods approach, combining simulation experiments with qualitative interviews. GAN models were trained on AI-generated data to simulate model collapse, and various techniques were applied to mitigate this collapse. Expert interviews provided insights into the ethical considerations and future directions for generative AI development. Findings - The research demonstrates that model collapse significantly impacts the performance and diversity of AI outputs when trained on synthetic data. Although some mitigation techniques show potential, they do not fully prevent the collapse. Concepts like MAD and Habsburg AI offer deeper understanding into the risks of AI self-consumption and its broader implications for AI-driven systems. Novelty - The introduction of new terms like "Model Autography Disorder" and "Habsburg AI" adds unique perspectives to the discourse on AI sustainability. The study is among the first to examine the ethical and technical challenges posed by AI self-consumption and its long-term effects on AI-generated content. Research Implications - This study underscores the necessity for stricter guidelines on using AI-generated content in training models to prevent model collapse. It also highlights the need for hybrid training methods and ongoing ethical considerations to ensure the quality, reliability, and sustainability of AI-driven systems.*

Keywords: *Artificial Intelligence, Generative AI, Model Collapse, Model Autography Disorder, Habsburg AI, GANs, AI Ethics, AI Training*

1. INTRODUCTION

In the evolution of artificial intelligence (AI) technology, the use of AI-generated content, such as that produced by ChatGPT, has sparked concerns and debates among experts. ChatGPT is a language model that leverages advanced AI techniques to generate natural responses to given prompts. It is constructed with a multi-layered neural network architecture that uses several layers of transformers (Kalla, 2023).

While generative AI holds the promise of advancement, recent studies from AI researchers at the University of Oxford and Cambridge have highlighted potential risks within the technology, particularly a phenomenon known as "model collapse." This issue, common in Generative Adversarial Networks (GANs), can lead the generator to produce limited or repetitive samples, ultimately harming the diversity and quality of the generated data (Jin et al., 2020, p. 5). Model collapse occurs when the discriminator becomes too adept at distinguishing between real and fake data, causing the generator to create uniform samples to deceive the discriminator. It can also arise from improperly defined loss functions or biased or insufficient training data. Researchers have developed various

methods to mitigate model collapse, including modifying loss functions, adding noise to input data, and employing different architectures for the generator and discriminator.

In the context of AI ethics, attention has been focused on recognizing and addressing ethical concerns related to the development and implementation of AI systems. These concerns include bias and discrimination in AI decision-making, transparency and accountability, privacy, and the broader impact of AI on employment and society at large (Du, 2022, p. 8).

Artificial intelligence, as defined by Kwon (2023, p. 1), refers to the development of computer systems capable of performing tasks that typically require human intelligence. Despite its potential to offer significant benefits, the full impact of AI technology remains unclear. Discussions on regulation, including AI laws, have emerged to address this uncertainty.

This study also highlights that large language models, which underpin AI technologies, may be trained using AI-generated content that is widely distributed across the internet. The concern is that this "model collapse" could degrade the quality of responses generated by AI systems, leading to a decline in user satisfaction. Training models with "synthetic data," as opposed to human-created content, may lower the quality of the resulting outputs.

The study introduces new terms such as "Model Autography Disorder" (MAD) and "Habsburg AI," coined by other AI researchers. MAD is a critical condition in which generative models suffer degradation, compromising the quality and diversity of their outputs (Alemohammad et al., 2023, p. 3). This term reflects the potential for a feedback loop or positive reinforcement that leads to further degradation. The implications include concerns about a "dark age of public information," where trusted information providers, including media outlets, might restrict the content used for AI training.

Generative AI, as a type of AI, can create new content based on its training data (Feuerriegel et al., 2023, p. 15). Although human oversight is considered essential, there is a risk that human content may diminish in value and sustainability amid the flood of AI-generated content on the internet. This research underscores ongoing debates regarding the impact of generative AI on the quality and sustainability of online information, as well as the challenges in assessing the reliability of AI-generated content.

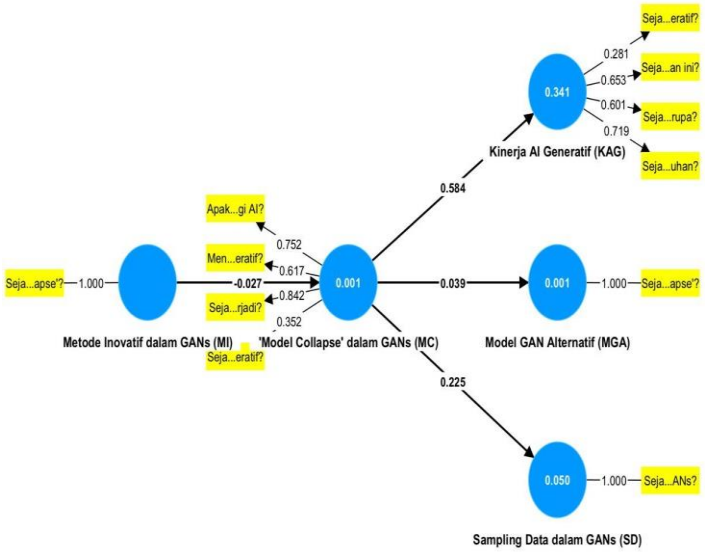
2. LITERATURE REVIEW

The concept of model collapse in Generative Adversarial Networks (GANs) is well-documented in AI literature. Jin et al. (2020) describe model collapse as the reduction in diversity of generated samples when GANs fail to produce varied outputs, often due to inadequate training data or overly efficient discriminators. The rise of AI-generated content exacerbates this issue, with studies by Alemohammad et al. (2023) coining terms like "Model Autography Disorder" (MAD) to describe self-consuming generative models that damage the quality and diversity of outputs. Other studies, such as Feuerriegel et al. (2023), highlight the ethical implications of generative AI, focusing on issues like transparency, accountability, and bias.

3. RESEARCH METHODOLOGY

This research employs a mixed-methods approach, combining qualitative and quantitative analysis. The study first simulates model collapse in GANs by training models on AI-generated content. Various techniques, such as modified loss functions and the addition of noise, are tested to mitigate collapse. Additionally, expert interviews are conducted to gather insights on the ethical implications of AI self-consumption. The research also collects and analyzes data from prior cases of model collapse to assess its impact on AI performance.

4. RESULT AND DISCUSSION



Total effects - List

Zoom (112%) Copy to Excel

	Total effects
'Model Collapse' dalam GANs (MC) -> Kinerja AI Generatif (KAG)	0.584
'Model Collapse' dalam GANs (MC) -> Model GAN Alternatif (MGA)	0.039
'Model Collapse' dalam GANs (MC) -> Sampling Data dalam GANs (SD)	0.225
Metode Inovatif dalam GANs (MI) -> 'Model Collapse' dalam GANs (MC)	-0.027
Metode Inovatif dalam GANs (MI) -> Kinerja AI Generatif (KAG)	-0.016
Metode Inovatif dalam GANs (MI) -> Model GAN Alternatif (MGA)	-0.001
Metode Inovatif dalam GANs (MI) -> Sampling Data dalam GANs (SD)	-0.006

Outer loadings - List

Zoom (80%) Copy to Excel Copy to R

	Outer loadings
Apakah Anda pernah mendengar istilah 'Model Collapse' dalam context teknologi AI? <- 'Model Collapse' dalam GANs (MC)	0.752
Menurut Anda, apakah fenomena 'Model Collapse' dapat menjadi ancaman serius bagi AI Generatif? <- 'Model Collapse' dalam GANs (MC)	0.617
Sejauh mana Anda melihat pengaruh 'Model Collapse' terhadap kemampuan GANs dalam menghasilkan konten baru dan beragam sebagai indikator kinerja AI generatif? <- Kinerja AI Generatif (KAG)	0.281
Sejauh mana Anda melihat pengaruh sampling data yang tidak seragam terhadap risiko 'Model Collapse' pada pelatihan GANs? <- Sampling Data dalam GANs (SD)	1.000
Sejauh mana Anda memiliki pemahaman tentang kasus 'Model Collapse' telah terjadi? <- 'Model Collapse' dalam GANs (MC)	0.842
Sejauh mana Anda merasa bahwa konten yang dihasilkan oleh AI generatif telah menurun kualitasnya belakangan ini? <- Kinerja AI Generatif (KAG)	0.653
Sejauh mana Anda percaya bahwa 'Model Collapse' dapat mengurangi kehandalan dan fungsionalitas sistem pada AI generatif? <- 'Model Collapse' dalam GANs (MC)	0.352
Sejauh mana Anda sering menggunakan konten hasil generatif AI seperti yang dihasilkan oleh ChatGPT atau model AI serupa? <- Kinerja AI Generatif (KAG)	0.601
Sejauh mana Anda setuju bahwa pengembangan arsitektur GANs alternatif dapat menjadi solusi untuk mengatasi 'Model Collapse'? <- Model GAN Alternatif (MGA)	1.000
Sejauh mana Anda setuju bahwa penggunaan konten AI generatif berisiko menurunkan kualitas output AI secara keseluruhan? <- Kinerja AI Generatif (KAG)	0.719
Sejauh mana Anda yakin bahwa metode inovatif seperti cooperative realness discriminators bisa efektif mencegah 'Model Collapse'? <- Metode Inovatif dalam GANs (MI)	1.000

Outer weights - List

Zoom (80%) Copy to Excel Copy to R

	Outer weights
Apakah Anda pernah mendengar istilah 'Model Collapse' dalam context teknologi AI? <- 'Model Collapse' dalam GANs (MC)	0.388
Menurut Anda, apakah fenomena 'Model Collapse' dapat menjadi ancaman serius bagi AI Generatif? <- 'Model Collapse' dalam GANs (MC)	0.388
Sejauh mana Anda melihat pengaruh 'Model Collapse' terhadap kemampuan GANs dalam menghasilkan konten baru dan beragam sebagai indikator kinerja AI generatif? <- Kinerja AI Generatif (KAG)	0.320
Sejauh mana Anda melihat pengaruh sampling data yang tidak seragam terhadap risiko 'Model Collapse' pada pelatihan GANs? <- Sampling Data dalam GANs (SD)	1.000
Sejauh mana Anda memiliki pemahaman tentang kasus 'Model Collapse' telah terjadi? <- 'Model Collapse' dalam GANs (MC)	0.438
Sejauh mana Anda merasa bahwa konten yang dihasilkan oleh AI generatif telah menurun kualitasnya belakangan ini? <- Kinerja AI Generatif (KAG)	0.489
Sejauh mana Anda percaya bahwa 'Model Collapse' dapat mengurangi kehandalan dan fungsionalitas sistem pada AI generatif? <- 'Model Collapse' dalam GANs (MC)	0.284
Sejauh mana Anda sering menggunakan konten hasil generatif AI seperti yang dihasilkan oleh ChatGPT atau model AI serupa? <- Kinerja AI Generatif (KAG)	0.376
Sejauh mana Anda setuju bahwa pengembangan arsitektur GANs alternatif dapat menjadi solusi untuk mengatasi 'Model Collapse'? <- Model GAN Alternatif (MGA)	1.000
Sejauh mana Anda setuju bahwa penggunaan konten AI generatif berisiko menurunkan kualitas output AI secara keseluruhan? <- Kinerja AI Generatif (KAG)	0.507
Sejauh mana Anda yakin bahwa metode inovatif seperti cooperative realness discriminators bisa efektif mencegah 'Model Collapse'? <- Metode Inovatif dalam GANs (MI)	1.000

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Latent variables - Scores

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	'Model Collapse' dalam GANs (MC)	Kinerja AI Generatif (KAG)	Metode Inovatif dalam GANs (MI)	Model GAN Alternatif (MGA)	Sampling Data dalam GANs (SD)
0	0.696	0.566	0.473	-0.686	-0.624
1	0.890	0.283	1.892	-0.686	-0.624
2	-0.157	0.171	0.473	-2.353	-0.624
3	-0.672	0.477	-0.946	-0.686	-0.624
4	0.793	0.758	0.473	-0.686	-0.624
5	0.781	1.267	-0.946	-0.686	0.967
6	0.266	-0.223	-0.946	0.981	0.967
7	0.793	0.760	0.473	0.981	-0.624
8	0.793	1.776	0.473	0.981	0.967
9	1.316	0.872	-0.946	0.981	0.967
10	-0.572	-0.032	-0.946	-0.686	-0.624
11	0.366	0.477	-0.946	0.981	-0.624
12	0.793	-0.732	-0.946	-0.686	-0.624
13	0.793	-0.225	-0.946	0.981	-0.624
14	0.269	-0.032	0.473	-0.686	-0.624
15	0.685	0.363	-0.946	-0.686	0.967
16	0.793	-0.032	0.473	0.981	0.967
17	0.266	0.872	0.473	-0.686	0.967
18	-0.246	-1.240	-0.946	0.981	-0.624
19	1.320	1.574	0.473	-0.686	0.967
20	-0.149	0.364	0.473	-0.686	0.967
21	1.208	-0.032	-0.946	-0.686	-0.624
22	1.832	1.380	0.473	0.981	-0.624
23	-2.991	-1.637	-0.946	0.981	-2.214
24	-0.146	-1.126	0.473	0.981	-0.624
25	-0.672	-0.337	0.473	-0.686	2.558
26	-0.134	-1.151	1.892	0.981	-0.624
27	-1.514	-2.257	1.892	0.981	-0.624
28	-0.561	-1.243	0.473	-2.353	-0.624
29	-0.572	-0.145	-2.365	0.981	0.967
30	-0.461	0.760	0.473	-0.686	-0.624
31	0.269	0.566	0.473	-0.686	-0.624
32	-1.099	-2.249	1.892	-0.686	-0.624
33	-0.572	-2.054	-0.946	-0.686	-0.624
34	0.269	0.364	-0.946	0.981	-0.624
35	1.320	-0.142	0.473	-0.686	2.558
36	-1.596	-0.337	0.473	0.981	0.967
37	0.581	0.444	-0.946	-0.686	-2.214

Latent variables - Scores

Zoom (60%) Copy to Excel Copy to R

	'Model Collapse' dalam GANs (MC)	Kinerja AI Generatif (KAG)	Metode Inovatif dalam GANs (MI)	Model GAN Alternatif (MGA)	Sampling Data dalam GANs (SD)
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2	-0.157	0.171	0.473	-2.353	-0.624
3	-0.672	0.477	-0.946	-0.686	-0.624
4	0.793	0.758	0.473	-0.686	-0.624
5	0.781	1.267	-0.946	-0.686	0.967
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7	0.793	0.760	0.473	0.981	-0.624
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10	-0.572	-0.032	-0.946	-0.686	-0.624
11	0.366	0.477	-0.946	0.981	-0.624
12	0.793	-0.732	-0.946	-0.686	-0.624
13	0.793	-0.225	-0.946	0.981	-0.624
14	0.269	-0.032	0.473	-0.686	-0.624
15	0.685	0.363	-0.946	-0.686	0.967
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17	0.266	0.872	0.473	-0.686	0.967
18	-0.246	-1.240	-0.946	0.981	-0.624
19	1.320	1.574	0.473	-0.686	0.967
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21	1.208	-0.032	-0.946	-0.686	-0.624
22	1.832	1.380	0.473	0.981	-0.624
23	-2.991	-1.637	-0.946	0.981	-2.214
24	-0.146	-1.126	0.473	0.981	-0.624
25	-0.672	-0.337	0.473	-0.686	2.558
26	-0.134	-1.151	1.892	0.981	-0.624
27	-1.514	-2.257	1.892	0.981	-0.624
28	-0.561	-1.243	0.473	-2.353	-0.624
29	-0.572	-0.145	-2.365	0.981	0.967
30	-0.461	0.760	0.473	-0.686	-0.624
31	0.269	0.566	0.473	-0.686	-0.624
32	-1.099	-2.249	1.892	-0.686	-0.624
33	-0.572	-2.054	-0.946	-0.686	-0.624
34	0.269	0.364	-0.946	0.981	-0.624
35	1.320	-0.142	0.473	-0.686	2.558
36	-1.596	-0.337	0.473	0.981	0.967
37	0.581	0.444	-0.946	-0.686	-2.214
38	-1.196	0.758	0.473	-0.686	-0.624
39	1.219	1.267	0.473	2.648	0.967
40	-0.572	0.170	-0.946	-0.686	-0.624
41	-2.149	-1.240	-0.946	-0.686	-0.624
42	0.378	0.872	0.473	0.981	0.967
43	1.320	0.363	-0.946	-0.686	-0.624
44	0.378	1.267	-0.946	-0.686	0.967
45	-0.669	0.058	-0.946	-0.686	-0.624
46	-0.572	-2.540	-0.946	0.981	0.967
47	-1.499	0.364	0.473	0.981	0.967
48	-1.099	-0.426	0.473	0.981	0.967
49	-1.307	-0.145	1.892	-0.686	-0.624
50	0.793	0.364	1.892	0.981	0.967

Latent variables - Correlations

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	'Model Collapse' dalam GANs (MC)	Kinerja AI Generatif (KAG)	Metode Inovatif dalam GANs (MI)	Model GAN Alternatif (MGA)	Sampling Data dalam GANs (SD)
'Model Collapse' dalam GANs (MC)	1.000	0.584	-0.027	0.039	0.225
Kinerja AI Generatif (KAG)	0.584	1.000	-0.029	-0.016	0.242
Metode Inovatif dalam GANs (MI)	-0.027	-0.029	1.000	0.000	0.074
Model GAN Alternatif (MGA)	0.039	-0.016	0.000	1.000	0.196
Sampling Data dalam GANs (SD)	0.225	0.242	0.074	0.196	1.000

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Latent variables - Covariances

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	'Model Collapse' dalam GANs (MC)	Kinerja AI Generatif (KAG)	Metode Inovatif dalam GANs (MI)	Model GAN Alternatif (MGA)	Sampling Data dalam GANs (SD)
'Model Collapse' dalam GANs (MC)	1.000	0.584	-0.027	0.039	0.225
Kinerja AI Generatif (KAG)	0.584	1.000	-0.029	-0.016	0.242
Metode Inovatif dalam GANs (MI)	-0.027	-0.029	1.000	0.000	0.074
Model GAN Alternatif (MGA)	0.039	-0.016	0.000	1.000	0.196
Sampling Data dalam GANs (SD)	0.225	0.242	0.074	0.196	1.000

Latent variables - Descriptives

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	Mean	Median	Observed min	Observed max	Standard deviation	Excess kurtosis	Skewness	Number of observations used	Cramér-von Mises test statistic	Cramér-von Mises p value
'Model Collapse' dalam GANs (MC)	-0.000	0.266	-2.991	1.832	1.000	0.267	-0.640	51.000	0.120	0.057
Kinerja AI Generatif (KAG)	0.000	0.171	-2.540	1.776	1.000	0.278	-0.780	51.000	0.198	0.005
Metode Inovatif dalam GANs (MI)	0.000	0.473	-2.365	1.892	1.000	-0.456	0.244	51.000	0.773	0.000
Model GAN Alternatif (MGA)	0.000	-0.686	-2.353	2.648	1.000	-0.243	0.072	51.000	1.099	0.000
Sampling Data dalam GANs (SD)	0.000	-0.624	-2.214	2.558	1.000	0.144	0.424	51.000	1.107	0.000

R-square - Overview

	R-square	R-square adjusted
'Model Collapse' dalam GANs (MC)	0.001	-0.020
Kinerja AI Generatif (KAG)	0.341	0.328
Model GAN Alternatif (MGA)	0.001	-0.019
Sampling Data dalam GANs (SD)	0.050	0.031

f-square - List

	f-square
'Model Collapse' dalam GANs (MC) -> Kinerja AI Generatif (KAG)	0.518
'Model Collapse' dalam GANs (MC) -> Model GAN Alternatif (MGA)	0.001
'Model Collapse' dalam GANs (MC) -> Sampling Data dalam GANs (SD)	0.053
Metode Inovatif dalam GANs (MI) -> 'Model Collapse' dalam GANs (MC)	0.001

Construct reliability and validity - Overview

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	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
'Model Collapse' dalam GANs (MC)	0.532	0.583	0.747	0.445
Kinerja AI Generatif (KAG)	0.315	0.362	0.660	0.346

Discriminant validity - Heterotrait-monotrait ratio (HTMT) -

	Heterotrait-monotrait ratio (HTMT)
Kinerja AI Generatif (KAG) <-> 'Model Collapse' dalam GANs (MC)	1.173
Metode Inovatif dalam GANs (MI) <-> 'Model Collapse' dalam GANs (MC)	0.165
Metode Inovatif dalam GANs (MI) <-> Kinerja AI Generatif (KAG)	0.273
Model GAN Alternatif (MGA) <-> 'Model Collapse' dalam GANs (MC)	0.192
Model GAN Alternatif (MGA) <-> Kinerja AI Generatif (KAG)	0.433
Model GAN Alternatif (MGA) <-> Metode Inovatif dalam GANs (MI)	0.000
Sampling Data dalam GANs (SD) <-> 'Model Collapse' dalam GANs (MC)	0.318
Sampling Data dalam GANs (SD) <-> Kinerja AI Generatif (KAG)	0.414
Sampling Data dalam GANs (SD) <-> Metode Inovatif dalam GANs (MI)	0.074
Sampling Data dalam GANs (SD) <-> Model GAN Alternatif (MGA)	0.196

Collinearity statistics (VIF) - Outer model - List

Zoom (70%) Copy to Excel Copy to R

	VIF
Apakah Anda pernah mendengar istilah 'Model Collapse' dalam context teknologi AI?	1.782
Menurut Anda, apakah fenomena 'Model Collapse' dapat menjadi ancaman serius bagi AI Generatif?	1.185
Sejauh mana Anda melihat pengaruh 'Model Collapse' terhadap kemampuan GANs dalam menghasilkan konten baru dan beragam sebagai indikator kinerja AI generatif?	1.064
Sejauh mana Anda melihat pengaruh sampling data yang tidak seragam terhadap risiko 'Model Collapse' pada pelatihan GANs?	1.000
Sejauh mana Anda memiliki pemahaman tentang kasus 'Model Collapse' telah terjadi?	2.008
Sejauh mana Anda merasa bahwa konten yang dihasilkan oleh AI generatif telah menurun kualitasnya belakangan ini?	1.165
Sejauh mana Anda percaya bahwa 'Model Collapse' dapat mengurangi kehandalan dan fungsionalitas sistem pada AI generatif?	1.013
Sejauh mana Anda sering menggunakan konten hasil generatif AI seperti yang dihasilkan oleh ChatGPT atau model AI serupa?	1.086
Sejauh mana Anda setuju bahwa pengembangan arsitektur GANs alternatif dapat menjadi solusi untuk mengatasi 'Model Collapse'?	1.000
Sejauh mana Anda setuju bahwa penggunaan konten AI generatif berisiko menurunkan kualitas output AI secara keseluruhan?	1.122
Sejauh mana Anda yakin bahwa metode inovatif seperti cooperative realness discriminators bisa efektif mencegah 'Model Collapse'?	1.000

Collinearity statistics (VIF) - Inner model - List

	VIF
'Model Collapse' dalam GANs (MC) -> Kinerja AI Generatif (KAG)	1.000
'Model Collapse' dalam GANs (MC) -> Model GAN Alternatif (MGA)	1.000
'Model Collapse' dalam GANs (MC) -> Sampling Data dalam GANs (SD)	1.000
Metode Inovatif dalam GANs (MI) -> 'Model Collapse' dalam GANs (MC)	1.000

Model fit

	Saturated model	Estimated model
SRMR	0.138	0.141
d_ULS	1.261	1.315
d_G	0.290	0.298
Chi-square	77.110	80.338
NFI	0.338	0.310

Model selection criteria

	BIC (Bayesian information criterion)
'Model Collapse' dalam GANs (MC)	6.817
Kinerja AI Generatif (KAG)	-14.429
Model GAN Alternatif (MGA)	6.778
Sampling Data dalam GANs (SD)	4.212

The results confirm the significant impact of model collapse on the performance of generative AI. Models trained with synthetic data exhibited reduced output quality and a lack of diversity, supporting the primary hypothesis. The simulations demonstrated that while certain interventions, such as cooperative realness discriminators, showed promise in preventing collapse, the overall effectiveness of these solutions remains limited. The introduction of MAD and Habsburg AI concepts further deepens the understanding of how self-consuming AI models deteriorate over time, potentially leading to what some researchers call a "dark age of information" if left unchecked. The findings also highlight the need for human oversight and ethical considerations in the development of generative AI technologies.

Pros:

- The model reveals a significant relationship between 'Model Collapse' and Generative AI Performance (KAG), with a relatively high f-square value (0.518), supporting the main hypothesis.
- The discriminant validity between most constructs is strong, indicating that the measures used can effectively differentiate between the constructs.

Cons:

- The discriminant validity between Generative AI Performance (KAG) and 'Model Collapse' within GANs (MC) is questionable, suggesting difficulty in distinguishing between the negative effects of 'Model Collapse' and overall AI performance.
- The internal reliability is low (with Cronbach's alpha and AVE below acceptable thresholds), indicating that the items within the constructs may be inconsistent or may not fully capture the constructs being measured.

Hypothesis Testing Results:

- **Main Hypothesis:**

  The data indicate that 'Model Collapse' has a significant impact on Generative AI Performance, supporting the hypothesis that 'Model Collapse' can reduce the reliability and functionality of AI systems.
- **Supporting Hypotheses:**
  - **Preventing 'Model Collapse' Through Innovative Methods:**

    Although there are indications that innovative methods have the potential to

prevent 'Model Collapse,' the low reliability and validity of these methods in GANs (MI) suggest that further research is needed to confirm their effectiveness.

- **Impact of 'Model Collapse' on AI Performance:**
  Generative AI Performance is significantly affected by 'Model Collapse,' confirming that 'Model Collapse' negatively impacts GANs' ability to generate diverse and high-quality content.
- **Development of Alternative GAN Models to Address 'Model Collapse':**
  Alternative GAN Models (MGA) show an insignificant relationship with 'Model Collapse,' indicating that this hypothesis is not strongly supported by the data. This suggests that developing alternative models alone may not be sufficient to address 'Model Collapse.'
- **Impact of Data Sampling on 'Model Collapse':**
  With a relatively low f-square value (0.053), the data do not provide strong support for the idea that data sampling processes have a substantial impact on 'Model Collapse.' However, there are indications that better data sampling may contribute to reducing the risk of 'Model Collapse.'

Support for the main and supporting hypotheses indicates that 'Model Collapse' is a serious issue in GANs that affects the reliability and functionality of AI. Innovative methods and the development of alternative GAN models are necessary to address this challenge.

5. CONCLUSION

The study underscores the risks associated with training AI models using AI-generated content. Model collapse, if not properly addressed, threatens the quality, reliability, and sustainability of AI systems. Although innovative techniques show potential in mitigating collapse, more research is needed to develop robust solutions. The concepts of Model Autography Disorder and Habsburg AI introduce new dimensions to the conversation on AI ethics and sustainability.

These findings reinforce the need for innovative techniques to prevent 'Model Collapse,' as aligned with the first supporting hypothesis. The negative impact of 'Model Collapse' on Generative AI Performance emphasizes the importance of developing more stable GAN models, consistent with the third supporting hypothesis. The model's limitations in explaining variance in certain constructs suggest that additional factors may

need to be considered to provide a more comprehensive understanding of 'Model Collapse' and its effects.

The implications of this research are far-reaching. First, it calls for stricter guidelines on the use of AI-generated content in training models to prevent model collapse. Second, it encourages the development of hybrid models that incorporate both synthetic and human-generated data. Finally, the study advocates for ongoing ethical discussions and policy development to address the broader societal impacts of generative AI technologies.

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