Online Appendix

Party Equalization or Normalization through Visual Generative AI in the 2025 German Federal Election

Simon Kruschinski & Fabio Votta

Media and Communication 14. https://doi.org/10.17645/mac.11859

SECTION A: Data Collection

A.1 Table 1. Characteristics and post count of German parties included in the analysis

	Political position / ideology[1]	Party members 2025	Second Votes 2021 / 2025[5]	Campaign budget BTW2025	Founding year[2]	Accounts / Posts in the analysis
Major parties Represented by at least five members of the Bundestag or a state parliament on the basis of its own nominations						**4,956 / 67,018**
AfD	Far-right / Völkisch nationalism, Right-wing populism, National conservatism, Euroscepticism	51.370[4]	10.4% / 20.8%	€6m[7]	2013	239 / 7,146
BSW	Left-wing to far-left / Left-wing populism, Left-wing nationalism, Socialism, Cultural conservatism	2.600[4]	— / 4.98%	€6m[6]	2024	20 / 692
CDU/ CSU	Centre-right / Christian democracy Conservatism	365.000[3] 130.000[4]	19.0% / 22.6% 5.2% / 6.0%	€28m[6] not reported	1945 1945	1,065 / 13,545
FDP (Gov)	Centre-right / Liberalism	60.000[3]	11.4% / 4.3%	not reported	1948	522 / 8,782
Freie Wähler	Centre-right / Regionalism, Liberal conservatism	8.700[2]	2.4% / 1.5%	not reported	2009	104 / 1,442
SPD (Gov)	Centre-left / Social democracy	358.322[3]	25.7% / 16.4%	€15m[6]	1863	1,154 / 14,577
B90/Die Grünen The Greens (Gov)	Centre-left / Green politics, Social Liberalism	168.000[3]	14.7% / 11.6%	€19m[6]	1980	839 / 15,719
Die Linke The Left	Left-wing / Democratic socialism, Left-wing populism	83.663[4]	4.9% / 8.8%	€6.5m[7]	2007	280 / 5,115
Minor parties						**98 / 1,976**
Bayernpartei	Centre-right / Bavarian nationalism, Regionalism Conservatism, Christian democracy	4.217[2]	0.07% / 0.0%	not reported	1946	5 / 131
Bergpartei, die Überpartei	Left-wing / Post-left anarchy, Green anarchism, Dadaism, Autonomism	229[2]	— / —	not reported	2011	2 / 3
BIG	Muslim interests, Political islam, migration politics, conservatism	2.000[2]	— / —	not reported	2010	2 / 5
Brandenburger Vereinigte Bürger	Regional, Regionalism, Liberalism	910[1]	— / —	not reported	2008	1 / 7
Bündnis C	Right-wing / Christian right fundamentalism, Social conservatism	1.015[2]	0.1% / 0.0%	not reported	2015	2 / 9
Bündnis Grundeinkommen	Centre / Single-issue party for unconditional basic income	150[1]	— / —	not reported	2016	1 / 1
BüSo	LaRouchism, Climate change denial	400[2]	0.0% / 0.0%	not reported	1992	1 / 12

Demokratie in Bewegung	Left-wing / Democratic socialism, Alter-globalism, Eco-feminism, Pro-Europeanism	224[1]	0.0% / —	not reported	2017	2 / 17
Die Basis	Right-wing / anti-establishment	18.988[2]	1.4% / 0.2%	not reported	2020	8 / 292
Die PARTEI	Left-wing / Political satire, Humanism, Anti-fascism, Pro-Europeanism	54.292[2]	1.0% / 0.5%	not reported	2004	4 / 35
Die Urbane. Eine HipHop Partei	Left-wing / Social justice, Localism, Environmentalism	432[1]	0.0% / —	not reported	2017	1 / 2
Deutsche Kommunistische Partei	Far-left / Communism, Marxism-Leninism	2.682[1]	0.0% / —	not reported	1968	2 / 39
Familien-Partei	Right-wing / Social conservatism, Christian democracy, Familialism	611[1]	0.0% / —	not reported	1981	1 / 5
Magdeburger Gartenpartei	Pro-Allotment, Environmentalism	349[1]	0.0% / —	not reported	2013	1 / 3
Menschliche Welt	Left-wing / Spiritualism, Pacifism	660[1]	0.0% / 0.0%	not reported	2013	1 / 16
MLPD	Far-left / Communism, Marxism–Leninism, Maoism, Stalinism	2.800[2]	0.0% / 0.0%	not reported	1982	2 / 39
NPD/Heimat	Far-right / Neo-Nazism, Völkisch nationalism, Antisemitism	3.000[2]	0.1% / —	not reported	1964	11 / 75
ÖDP	Centre-left / Green conservatism, Social conservatism, Catholic left, Degrowth	7.000[2]	0.2% / 0.1%	not reported	1981	2 / 102
Partei der Humanisten	Centre-left / European federalism, humanism, Left liberalism, Rationalism, Laicism	2.300[2]	0.1% / 0.0%	not reported	2014	7 / 146
Partei der Vernunft	Libertarianism	250[2]	— / —	not reported	2009	2 / 48
PdF	Centre-left / Grassroots democracy, Social liberalism, Pro-Europeanism	620[2]	0.01% / 0.0%	not reported	2020	2 / 158
PIRATEN	Left-wing / E-democracy, Direct democracy, Social liberalism, Anti-corruption, European federalism	4.649[2]	0.4% / 0.0%	not reported	2006	4 / 17
SGP	Far-left / Marxism, Trotskyism	294[1]	0.0% / 0.0%	not reported	1971	2 / 59
SSW	Centre-left / Regionalism, Danish minority interests, Frisian minority interests, Social liberalism	3.104[2]	0.1% / 0.2%	not reported	1948	2 / 83
Thüringer Heimatpartei - THP	Far-right / Regionalism, Right-wing populism	56[2]	0.0% / —	not reported	2020	1 / 1

Tierschutzpartei	Left-wing / Animal rights, Animal welfare, EnvironmentalismVeganism	2.506[2]	1.5% / 1.0%	not reported	1993	2 / 35
V-Partei[3]	Left-wing / Animal rights, Environmentalism	971[2]	0.1% / —	not reported	2016	2 / 27
VOLT	Centre-left / European federalism, Pan-Europeanism, Progressivism, Social liberalism	8.341[2]	0.4% / 0.7%	not reported	2018	22 / 566
WerteUnion	Right-wing / National conservatism, Economic liberalism, Right-wing populism	1386[2]	— / 0.0%	not reported	2024	1 / 43

Note: Parties in bold were members of the outgoing federal government formed in 2021.
[1] https://www.wikidata.org/wiki
[2] https://www.bpb.de/themen/parteien/wer-steht-zur-wahl/bundestagswahl-2025/
[3] https://www.spiegel.de/politik/cdu-partei-ueberholt-spd-bei-zahl-der-mitglieder-a-f1ec4d11-e0b1-4609-8865-4757ab53581c
[4] https://www.deutschlandfunk.de/cdu-ueberholte-2024-spd-als-mitgliederstaerkste-partei-deutschlands-100.html
[5] https://www.bundeswahlleiterin.de/bundestagswahlen/2025/ergebnisse/bund-99.html
[6] https://www.focus.de/politik/deutschland/cdu-erhoeht-budget-auf-28-millionen-euro-parteien-geben-mehrere-millionen-euro-fuer-bundestagwahlkampf-aus_id_260674521.html
[7] https://www.morgenpost.de/politik/article407810072/so-viel-geld-geben-die-parteien-im-wahlkampf-aus.html

A.2 Platform Overview

Bright Data provides structured API access to publicly available social media content through its Social Media API Suite. The suite offers dedicated endpoints for:

- Profiles API: Collects data on user/channel profiles including follower counts and content statistics

- Posts API: Provides data on individual posts with engagement metrics (likes, views, shares, comments)

- Comments API: Offers engagement data on comments and replies

A.3 Data Collection Methodology

For this study, we collected all posts from identified party accounts on Facebook and Instagram (see Table A1) for the four-week period preceding the February 23, 2025 federal election. Data were collected daily, ensuring the most current publicly available content. Output was delivered in structured JSON format via API endpoints.

Bright Data accesses platform content through a network of opted-in residential IP addresses, reducing platform-side blocking. The platform complies with EU data protection regulations (GDPR) and US data protection (CCPA).

A.4 Validation Against Meta Content Library API

To assess data reliability, we independently downloaded posts from a random sample of five accounts for the identical timeframe through both:

(a) The Meta Content Library API (Meta's official research data access)

(b) The Bright Data API

This comparison revealed no differences in post counts or content between the two sources, confirming the completeness and accuracy of our Bright Data collection. This cross-validation provides confidence that the commercial data infrastructure does not introduce systematic coverage biases for the political party accounts in our sample.

A.5 Potential Limitations

While our validation found no discrepancies, users should note:

- Bright Data collects only publicly available content; private posts or stories are excluded.

- Platform-specific access restrictions (e.g., rate limits, content availability) may vary over time.

- Historical replicability depends on content remaining publicly accessible.

SECTION B: AI Detection Methodology / “SightEngine” Technical Documentation

Our study employs SightEngine's AI-generated image detection API (model parameter: genai), a commercial computer vision service. This appendix provides full technical documentation as requested by the reviewers.

B.1 Model Architecture and Training

SightEngine's detection model uses convolutional neural networks (CNNs) that extract features from pixel-level content, including color patterns, texture anomalies, and compositional logic. The model was trained on millions of both human-created and AI-generated images spanning diverse content types including photography, art, drawings, and memes. Therefore, the model does not rely on watermarks (visible or invisible) but analyzes visual content directly, making it robust against watermark removal. Further, it does not condition on party identity, visual style categories, or political content. The outcome are therefore correlated with technical image properties (e.g., post-processing, compression, specific generator types) rather than with the substantive coding categories used in our content analysis.

The model detects outputs from major AI image generators including: Stable Diffusion, MidJourney, DALL-E/GPT, Flux, Firefly, Nano Banana, and Seedream. SightEngine continuously updates the model against new generators as they enter the market.

B.2 API Parameters and Implementation

We accessed the API using the genai model parameter. For each image in our dataset, we submitted the image URL or raw binary to SightEngine's REST API endpoint. The API returns a JSON response containing an ai_generated score (float between 0 and 1), where higher scores indicate greater likelihood of AI generation. See for full API documentation: https://sightengine.com/docs/ai-generated-image-detection

We used the Python SDK for systematic processing of all images.

Software versions: SightEngine API (accessed January-March 2025), Python 3.11, requests library.

B.3 Independent Benchmarking Evidence

SightEngine's performance has been independently validated. Li et al. (2024) introduced the ARIA (AdversaRIal AI-Art) dataset comprising over 140,000 real and AI-generated images across five categories (artworks, social media, news photos, disaster scenes, anime). On this benchmark, SightEngine achieved the highest accuracy (98.3%) among tested detection tools, making it the most reliable solution for identifying AI-generated media. (Reference: Li, Y., Liu, Z., Zhao, J., Ren, L., Li, F., Luo, J., & Luo, B. (2024). The Adversarial AI-Art: Understanding, Generation, Detection, and Benchmarking. In Computer Security — ESORICS 2024, Vol. 14982, pp. 311-331. https://doi.org/10.1007/978-3-031-70879-4_16)

B.4 Threshold Selection and Validation

The SightEngine API returns continuous scores. We tested two thresholds:

Conservative threshold (>= 0.5): Prioritizes precision to minimize false positives in our final dataset. This is the threshold used for the main analyses.

Sensitivity threshold (>= 0.1): Used to assess how many additional AI-generated posts the model identifies at lower confidence levels.

B.5 Performance Metrics on Held-Out Validation Set

Our validation was conducted on a held-out test set of n = 2,115 posts, of which 563 (27%) were manually confirmed as AI-generated by the project leaders.

Table A1. Performance at Threshold >= 0.5

Metric	Value
Accuracy	0.710
Precision	0.470
Recall	0.707
F1	0.565
Specificity	0.711
Coverage gap	29.3% of true AI images not flagged
Checks per true positive	2.1

Table A2. Confusion Matrix (Threshold >= 0.5):

	Actual Non-VGenAI	Actual VGenAI
Predicted VGenAI	448	398
Predicted Non-VGenAI	1,104	165

Table A3. Performance at Threshold >= 0.1

Metric	Value
Accuracy	0.547
Precision	0.350
Recall	0.824
F1	0.492
Specificity	0.445
Coverage gap	17.6% of true AI images not flagged
Checks per true positive	2.9

Table A4. Confusion Matrix (Threshold >= 0.1):

	Actual Non-VGenAI	Actual VGenAI
Predicted VGenAI	860	464
Predicted Non-VGenAI	692	99

SECTION C: Manual content analysis / AI classification

C.1 Table 2. Content analysis categories, coding instructions, and reliability values

Category	Coding instruction	Holsti's CR	Krippendorff's α
AI detection	Here, it is coded whether the image/video is completely or partly AI-generated, meaning it contains both AI-generated and real and/or "photoshopped" content. To detect AI-generated images, the learned visual clues from the coder training will be considered. Please see the following two manuals for a detailed introduction into detecting GenAI: 1)https://www.digitaldigging.org/p/the-essential-handbook-for-ai-detection 2) https://arxiv.org/pdf/2406.08651	0.98	0.97
AI Labeling in Image/Video	It is coded whether in the image/video a disclaimer ([warning]note; model disclaimer; C2PA disclaimer) as lettering or overlay is included that draws attention to the fact that it is AI-generated image content or video sequences.	0.98	0.88

AI Labeling in Post Text	It is coded whether in the post text a disclaimer (source of AI; "This image/video was created using AI"; "We use AI," "AI was used here," etc) is included that draws attention to the fact that it is AI-generated image content or video sequences.	0.99	0.76
AI Labeling in Post	It is coded whether the post includes a disclaimer by the platform ("AI info"; "Made with AI"; "Synthetic content") that draws attention to the fact that it is AI-generated image content or video sequences.	1	1
Visual style of the Image/Video	Either it is coded that the image/video shows real-seeming/real-looking content or gives the impression of showing real objects, people, or events. Or it is coded that the image/video does NOT contain real-looking content or does not give the impression of showing real objects, people, or events (e.g., graphics, drawings, cartoons, illustrations).	0.99	0.96
Topic	The central theme of the post is coded based on the primary subject matter, including policy issues, political/social debates, events (e.g., elections, parliamentary decisions). Categories include economy/finance (taxes, inflation, trade), labor/social issues (healthcare, family policy), domestic policy, immigration, environment/energy, and EU affairs. Multiple topics may be coded per post.	all topics > 0.90	all topics > 0.67
Personalization	Here it is coded which people are depicted in the image/video. For each of the listed person in the groups of national or international party elites, citizens, minority groups, actors depicted as illegals/criminals, or other (non) political public figures, it must be determined whether it is present in the picture/video. Coding decisions for non-political actors need to account for how the sender frames each actor; for example, migrants may be framed as 'minorities who need help' or as 'criminals who need to be deported'.	all persons > 0.88	all persons > 0.7

C.2 Coding scheme for AI detection

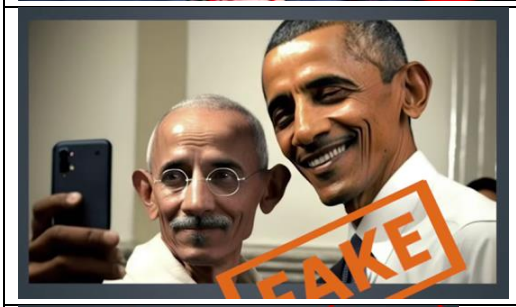
Here, it is coded whether the images shown are AI-generated images. In a world where machine learning and AI models are becoming more and more powerful, AI images have become increasingly important, including in the election campaign. They can include photos, digital artwork, 3D models, graphics, and much more. On the one hand, it is coded whether AI-generated image content or video sequences appear in the images and videos of the post.

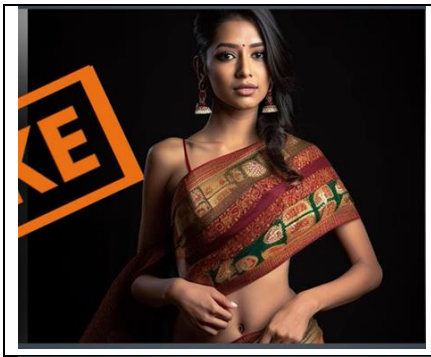
Category	**Description**	**Examples**	**Code**
KI_1 AI Image/Video	- Yes, the image/video is COMPLETELY AI-generated - The image/video is PARTLY AI-generated, meaning it contains both AI-generated and real or "photoshopped" content. - No, the image/video is NOT AI-generated / It is completely real or "photoshopped" - I am unsure whether the image/video (or parts of it) is AI-generated	 	1 2 3 4

To detect AI-generated images, the following clues will be considered. Please also see the following two manuals for a detailed introduction into detecting GenAI images:

1) AI Forensics (2025). The Human Guide to Detecting AI Imagery. Retrieved from https://aiforensics.org/work/ai-detection-guide

2) Kamali, N., Nakamura, K., Chatzimparmpas, A., Hullman, J., & Groh, M. (2024). How to distinguish AI-generated images from authentic photographs. *arXiv preprint arXiv:2406.08651*. https://arxiv.org/pdf/2406.08651

<table>
<tr><td colspan="2">Context Characteristics of AI-generated visuals</td></tr>
<tr><td>Communicator disclosures</td><td>Caption or label on the image indicates that it is an AI-generated image</td></tr>
<tr><td>Community disclosures</td><td>Comments below the image state that it is an AI-generated image</td></tr>
<tr><td>Identification by professional actors</td><td>Reverse image search identifies images flagged as AI-generated in a fact-check</td></tr>
<tr><td colspan="2">Characteristics of AI-generated visuals</td></tr>
<tr><td rowspan="2">  </td><td>Elements and objects overlap unnaturally / lack clear boundaries (e.g., helmets)</td></tr>
<tr><td>Colour / consistency of objects (e.g., blood) appears incorrect</td></tr>
<tr><td rowspan="2"> 
</td><td>Persons appear animated</td></tr>
<tr><td>Facial proportions (e.g., ears) appear unnatural</td></tr>
<tr><td rowspan="2"> 
</td><td>Persons appear animated</td></tr>
<tr><td>Eyes, ears, faces appear unnatural</td></tr>
<tr><td rowspan="4">  </td><td>Errors upon closer inspection and zoom</td></tr>
<tr><td>Fingers are incorrect (too many or too few)</td></tr>
<tr><td>The way objects are held in the hand appears unnatural</td></tr>
<tr><td>The shape of objects is incorrectly rendered (e.g., glasses)</td></tr>
</table>

	No moles, wrinkles, or skin blemishes on persons
	Image appears heavily smoothed
	Poor depth of field, causing the background to appear unnatural
	Persons partially duplicated in the background