Appendix 1: Low Bit Embedding Approach

Table Appendix 1: Low Bit Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
Bender (1996)	1	N/A	.WAV and AIFF	High imperceptibility	Low robustness and dynamic security
Nedeljko Cvejic & Seppanen (2002)	4	Minimum Error Replacement (MER)	.WAV	High capacity and imperceptibility	Low dynamic security
Indrayani (2020)	1-8	N/A	.WAV	High capacity, robustness and imperceptibility	Low dynamic security

Appendix 2: Variable Low Bit Embedding Approach

Table Appendix 2: Variable Low Bit Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
Ahmed et al. (2010)	8	Fixed amplitude threshold	.WAV	High robustness and capacity	Low imperceptibility and dynamic security
Hakeem et al. (2014)	1-8	Fixed amplitude threshold	.WAV	High robustness and capacity	Low dynamic security
K. Gopalan & Fu (2015)	Varies	Fixed amplitude threshold	.WAV	High capacity, robustness and imperceptibility	Low dynamic security
Alsabhany et al. (2018)	1-6	Huffman Encoding, AES encryption and dynamic amplitude threshold	.WAV	High robustness, capacity and imperceptibility	Inconsistent dynamic security
Alsabhany et al. ((2020)	1-6	Huffman Encoding, AES encryption and dynamic amplitude threshold	.WAV	High robustness, capacity and imperceptibility	Inconsistent dynamic security

Appendix 3: Sample Selection Embedding Approach

Table Appendix 3: Sample Selection Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
(Asad et al., 2012)	1	Huffman Encoding and AES encryption	.WAV	High imperceptibility	Low dynamic security
Hosny et al. (2019)	2	LFSR and population-based simulated annealing algorithm (PSA)	.WAV	High capacity	Inconsistent dynamic security

Appendix 4: Bit Selection Embedding Approach

Table Appendix 4: Bit Selection Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
Asad et al. (2011)	1	Huffman Encoding and AES encryption	.WAV	High imperceptibility	Low dynamic security
Hashim et al. (2018)	1	AES encryption	.WAV	High imperceptibility	Low dynamic security

Appendix 5: Parity Coding-based Embedding Approach

Table Appendix 5: Parity Coding-based Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
Kekre et al. (2010)	1	N/A	.WAV	High imperceptibility	Low dynamic security
Bahl & Ramakishore (2015)	1	Encryption	.WAV	High robustness	Low dynamic security
Usanto (2022)	1	RSA encryption	.WAV	High imperceptibility	Low dynamic security

Appendix 6: XOR-based Embedding Approach

Table Appendix 6: XOR-based Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
Kekre et al. (2010)	1	N/A	.WAV	High imperceptibility	Low robustness and dynamic security
Bahl & Ramakishore (2015)	1	Encryption	.WAV	High imperceptibility	Low robustness and dynamic security
Bharti et al. (2019)	1	N/A	.WAV	High imperceptibility	Low robustness and dynamic security

Appendix 7: Averaging the Amplitude-based Embedding Approach

Table Appendix 7: Averaging the Amplitude-based Embedding Approach

Author & Year	*bps* Used	Supportive Elements	Carrier Type	Main Advantages	Main Disadvantages
Wakiyama et al. (2010)	1-2	N/A	.WAV	High imperceptibility	Low robustness and dynamic security
G. Xin et al. (2018)	1-3	Encryption	.WAV	High capacity	Low robustness and dynamic security

Appendix 8: Cover-Quality-Based Selection Method

Table Appendix 8: Cover-Quality-Based Selection Method

Author & Year	Carrier	Selection Criteria	Supportive elements	Evaluation Aspect	Advantages	Disadvantages
Subhedar & Mankar, (2013)	Image	Image contrast	Optimized embedding	Imperceptibility	Improve imperceptibility	Lack of consideration on the trade-off.
Nazari, (2013)	Image	Run length matrices, textural features and SSIM	DWT embedding	Imperceptibility and steganalysis attack accuracy	Improve imperceptibility	Lack of consideration on the trade-off.
Yuan & Chen, (2014)	Image	Out-Of-Bag (OOB) steganalysis and directional filter residuals	Optimized embedding	Steganalysis attack accuracy	Imperceptibility	Lack of consideration on the trade-off.
Huang & Zhao, (2016)	Image	Linear pixel prediction error	N/A	Steganalysis attack accuracy	Improve imperceptibility	Lack of consideration on the trade-off.

Mansi S. Subhedar & Mankar, (2016)	Image	Contrast, correlation, uniformity and homogeneity	RDWT and QR decomposition-based embedding	Imperceptibility and steganalysis attack accuracy	Improve imperceptibility	Lack of consideration on the trade-off.
M. S. Subhedar & Mankar, (2018)	Image	spatial information mean, std. deviation and root mean square	Optimized block-based embedding	**Imperceptibility, robustness and steganalysis attack accuracy**	Improve imperceptibility and robustness	Lack of consideration on the trade-off.
Molato & Gerardo, (2018)	Image	Skewness colour intensities and kurtosis	LSB-embedding	Imperceptibility and steganalysis attack accuracy	Improve imperceptibility	Lack of consideration on the trade-off.
Esfahani et al., 2018)	Image	Image contrast and energy	Steganalysis evaluation	Steganalysis attack accuracy	Imperceptibility	Lack of consideration on the trade-off.

Abed et al., (2019)	Image	Relative entropy, histogram and local block pixel intensity	N/A	Imperceptibility and steganalysis attack accuracy	Improve imperceptibility	Lack of consideration on the trade-off.
Zhang et al., (2020)	Image	Image complexity	Optimized embedding	Robustness and steganalysis attack accuracy	Improve robustness	Lack of consideration on the trade-off.
Mansi S. Subhedar, (2021)	Image	Gray Level Co-occurrence Matrix (GLCM), Gray Level Run Length Matrix (GLRLM)	DDDTDWT-based embedding	Imperceptibility, robustness and steganalysis attack accuracy	Improve imperceptibility and robustness	Lack of consideration on the trade-off.
Hamid et al., (2021)	Image	Quality of JPEG compression, complexity,	Machine learning	Classifier	Improve imperceptibility	Lack of consideration on the trade-off.

		blockiness, heterogeneity, and deviation				
Qiao et al. (2021)	Image	Quality Factor of compression, Number of embedding place not touched	Error correction embedding	Robustness	Improve robustness	Lack of consideration on the trade-off.

Appendix 9: Similarity-Based Selection Method

Table Appendix 9: Similarity-Based Selection Method

Author & Year	Carrier	Selection Criteria	Supportive elements	Evaluation Metric	Advantages	Disadvantages
Abdul Sattar & Talib Gaata, (2017)	Image	Number of changes	Encryption, XOR LSB embedding	Imperceptibility	Improve imperceptibility	Lack of consideration on the trade-off. And depends on user knowledge.
Z. Wang et al., (2020)	Image	Number of changes	Optimized embedding, machine learning	Steganalysis attack accuracy	Improve imperceptibility	Lack of consideration on the trade-off. And selection depends heavily on learning process.
Shah & Bichkar, (2020)	Image	percentage of 1's in secret message and binary cover sample	Optimized embedding,	Imperceptibility	Improve imperceptibility	Lack of consideration on the trade-off.

						High time consumption.
Rashid, (2020)	Image	Match bits, PSNR, Different Image Histogram (DIH), Revisited Weighted Stego (RWS)	N/A	Imperceptibility and robustness	Improve imperceptibility Improve robustness	Lack of consideration on the trade-off.
Shyla et al. (2021)	Image	PSNR, RMSE	LSB-embedding	Imperceptibility	Improve imperceptibility	Lack of consideration on the trade-off. High time consumption.
Tingting et al. (2021)	Image	Image residual distance between stego-file and cover	Machine learning, optimized stego-file	Imperceptibility	Improve imperceptibility	Lack of consideration on the trade-off. And selection depends

						heavily on learning process.
(X. Chen et al., 2022)	Image	Hash value similarity produced from histogram value	cover less image embedding	Capacity and imperceptibility	Improve imperceptibility Improve capacity	Lack of consideration on the trade-off.

Appendix 10: Subregion-Based Selection Method

Table Appendix 10: Subregion-Based Selection Method

Author & Year	Carrier	Selection Criteria	Supportive Elements	Evaluation Aspect	Advantages	Disadvantages
Hajduk & Levický, (2018)	Image	Number of changes	DWT embedding	Imperceptibility and time consumption	Improve the imperceptibility characteristic	Lack of consideration on the trade-off.
Hajduk & Dušan Levický, (2017)	Image	Number of changes	Encryption and DWT embedding	Time consumption	Reduced time consumption	Lack of consideration on the trade-off.
J. Wang et al., (2019)	Video (HEVC format)	Number of changes	Private key and HEVC-based steganography	Imperceptibility and steganalysis attack accuracy	Improve the imperceptibility characteristic	Lack of consideration on the trade-off.
Vladimir Hajduk & Levicky, (2016)	Image	Number of changes	DWT embedding	Imperceptibility	Improve the imperceptibility characteristic	Lack of consideration on the trade-off.

Appendix 11: Batch-Based Selection Method

Table Appendix 11: Batch-Based Selection Method

Author & Year	Carrier	Selection Criteria	Supportive elements	Evaluation Aspect	Advantages	Disadvantages
Z. Wang et al., (2018)	Image	Number of changes	Optimized embedding	Selection accuracy	Improve the imperceptibility	Lack of consideration on the trade-off.
Z. Wang & Zhang, (2019)	Image	Number of changes, maximum mean discrepancy	Machine learning	Steganalysis attack accuracy	Improve imperceptibility Improve security against pooled steganalysis	Lack of consideration on the trade-off.
Hu et al., (2020)	Image	Similarity between cover and secret message	Semantic embedding model	Semantic relevancy	Improve the imperceptibility	Lack of consideration on the trade-off.

X. Hu et al., (2021)	Image	Intrinsic energy	N/A	Steganalysis attack accuracy	Improve the imperceptibility	Lack of consideration on the trade-off.
Zhong et al., (2021)	Image	Embedding capacity loss and steganalytic loss.	Machine learning	Steganalysis attack accuracy	Improve the imperceptibility	Lack of consideration on the trade-off.

Appendix 12: Audio Dataset