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Research article

Predicting Emerging Art Styles in AI-Generated Artworks

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ABSTRAK

The development of artificial intelligence (AI) technology has brought significant changes in various fields, including the arts. AI-generated art is no longer just a technical experiment, but has evolved into a recognized artistic medium, creating new opportunities in the exploration of creativity and aesthetics. This study evaluates the prediction of aesthetic trends that develop in artistic creativity using the analysis of artwork datasets generated by Artificial Intelligence (AI) based on Machine Learning. In the digital age, AI has become an essential tool in art exploration, producing works with unique styles, techniques, and aesthetics. The study aims to understand the aesthetic patterns and dynamics that emerge from AI artwork. The results of the research obtained can be seen that the random tree model is an appropriate algorithm in making predictions. Through this approach, this article not only contributes to art and technology literature but also provides insight into how the relationship between humans and AI can shape the contemporary art landscape. This research is expected to be the basis for the development of more inclusive and creative AI technology in the future.

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1. Introduction

Artistic creativity refers to the ability to produce works that are original and aesthetically valuable, often involving imagination and personal expression. Artistic creativity can be interpreted as the ability to create innovative and original works of art, which combine local cultural values with forms of artistic expression. According to [1], artistic creativity is a mental process that allows a person to produce ideas and works that are not only new but also have aesthetic and cultural value.

Human creativity has entered a new chapter with the presence of artificial intelligence (AI) as a collaborator in producing artworks. This phenomenon triggered a significant transformation in the way art is created, perceived, and studied[2]. AI-based art leverages advanced algorithms, such as Generative Adversarial Networks (GANs), to produce works that not only mimic but also create new interpretations of visual aesthetics. This transformation encourages discussions about the value of art, originality, and the role of AI in predicting future aesthetic trends [3][4]. Previous research has shown that AI-based artwork is able to reflect specific patterns and stylistic elements based on the dataset used[5]. For example, deep learning models such as Convolutional Neural Networks (CNNs) have been used to classify and generate new art styles inspired by famous artists [7]. Additionally, the integration of AI in art has enabled a cross-disciplinary approach that blends visual arts, technology, and philosophy to explore the meaning of aesthetics in digital contexts [6]. This research will use a machine learning method with a random tree algorithm. The research is also supported by several software such as Tableau[8], Microsoft Excel[9], and Rapid Miner[10] to simplify the research process.

However, there are still challenges in understanding the evolving aesthetic dynamics of AI-based art, especially regarding AI's ability to predict and shape new trends in art. These challenges include complex data analysis, algorithmic bias, and limitations in human interpretation of machine-generated artwork [11][12]. Therefore, this study aims to evaluate the predictive ability of AI against evolving aesthetic trends by utilizing AI-based artwork dataset studies[13]. Through this approach, this article not only contributes to art and technology literature but also provides insight into how the relationship between humans and AI can shape the contemporary art landscape[14]. This research is expected to be the basis for the development of more inclusive and creative AI technology in the future[15].

2. Research Methodology

In this study, there are several procedures that will be carried out so that the data produced can have high accuracy so as to support the credibility of the research content as shown in Figure 1.

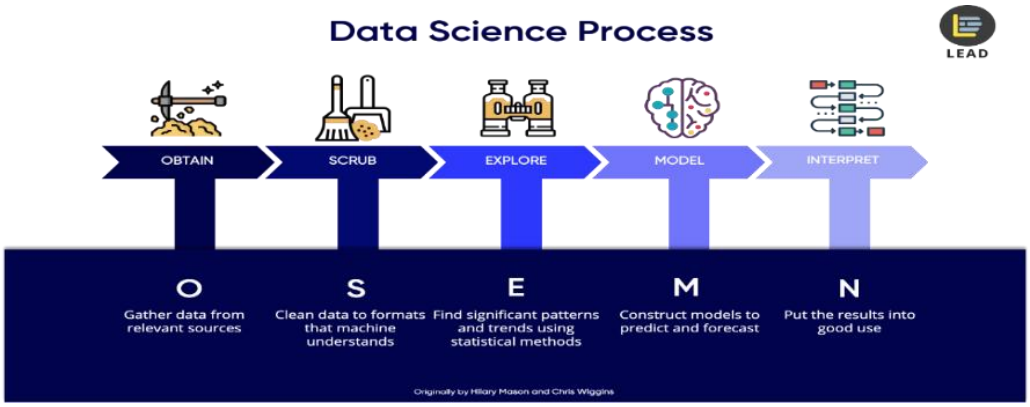

Figure 1. Data Science Process

The data will help various aspects in the future. Therefore, it is very necessary to minimize errors in processing data. The procedure carried out by the author uses a systematic approach consisting of five stages, namely OSEMN. Here's an explanation of each stage:

2.1 Obtain Data

In the first step, the author will collect data from various sources. This data can be numbers, text, images, and so on. It should be noted that the data must be accurate, complete and reliable. The data used in this study was obtained from the Kaggle (www.kaggle.com) website. Kaggle is an online platform for data science and machine learning professionals. Founded in 2010, Kaggle has become a premier destination for data scientists, data analysts, and learners looking to develop their skills, collaborate with others, and stay up-to-date with the latest developments in the field. The data contained in the website is quite accurate and complete, depending on what field you want to research.

2.2 Scrub Data

At this stage, cleaning is carried out from errors, redundancy and data inconsistencies. This process is important to identify abnormal data and ensure that the data to be studied is accurate. This data cleaning process is carried out using software from Windows, namely, Microsoft Excel. At this stage, problematic data is selected and data format is also standardized so that the data to be processed gets accurate results.

2.3 Explore Data

After the cleaning process, the author began to use various statistical and visualization techniques to look for patterns and trends in the data. At this stage, it is important to remain critical and not jump to conclusions from what you see. The author should consider various possibilities and look for relevant evidence according to the research objectives. At this stage, visualization of the data is carried out using Tableau to help facilitate the visualization process.

2.4 Model Building

With the knowledge gained from the data analysis process, authors can build models that can predict, group, or classify new data accurately. At this stage, the development of the data model is carried out using rapidminer software. RapidMiner is a science data software platform developed by the company of the same name, which provides a unified environment for machine learning, deep learning, text mining, and predictive analytics. In the process, the author uses a random tree algorithm to build a model from the data used.

2.5 Interpret Result

The model that has been successfully built will be applied in various aspects in accordance with the research objectives by contributing to the literature of art and technology. By doing this whole process carefully and critically, data scientists can help solve various problems in the world, especially completing the research that has been conducted.

3 Results and Discussion

3.1 Data Collection Results

The dataset used in this study was taken from a well-known online platform, Kaggle. The data to be studied can be seen in Figure 2, which is AI-ArtBench data that is stored to predict trends that develop every year.

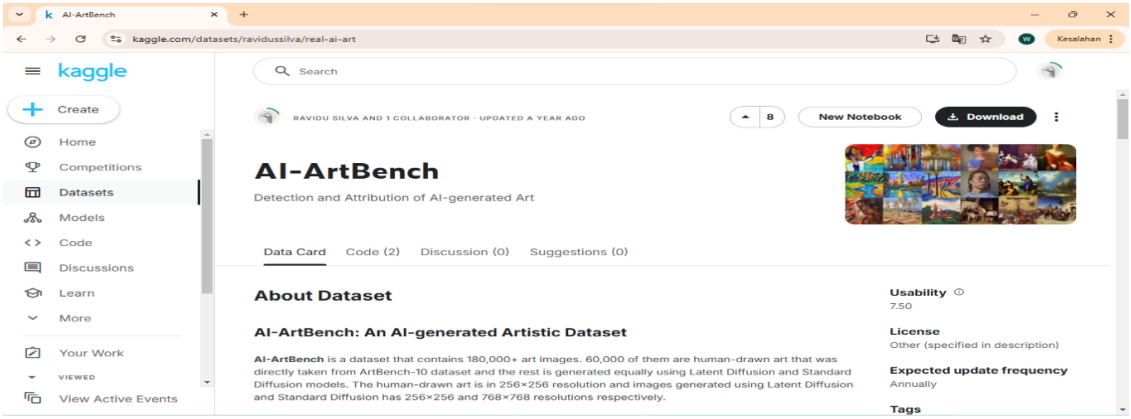

Figure 2. Datasets from Kaggle

3.2 Data Cleaning

At this stage, the author did not clean up the data. This is because after observing the data taken as shown in Figure 3 above, no errors were found that usually exist in datasets such as duplicate data, inconsistent data and so on. Therefore, it was decided to proceed to the next stage without changing the initial data content.

Row No.	Artwork_ID	Artist_Name	Art_Style	Creation_Da...	Medium	Tools_Used	Popularity_...	Region	Art_Genre	Platform
1	ART-00001	DALL-E	Conceptual	Mar 11, 2023	Collage	GANPaint	1604.250	South America	Urban	Instagram
2	ART-00002	AbstractoBot	Futurism	Nov 27, 2022	Oil Paint	MidJourney	4162.120	North America	Abstract	Dribbble
3	ART-00003	Vincent	Futurism	Mar 13, 2024	Charcoal	GANPaint	2989.380	Europe	Mythology	Reddit
4	ART-00004	ArtBreeder	Impressionism	Sep 12, 2022	Pencil Sketch	ArtBreeder	2985.970	Europe	Still Life	Tumblr
5	ART-00005	DALL-E	Surrealism	Dec 5, 2022	Collage	DeepDream	2035.180	Asia	Conceptual	DeviantArt
6	ART-00006	DALL-E	Futurism	Dec 13, 2022	Oil Paint	DALL-E	4535.590	Asia	Abstract	Instagram
7	ART-00007	NeoSurrealist	Abstract	Aug 19, 2024	Mixed Media	ArtBreeder	1473.920	South America	Nature	Behance
8	ART-00008	DALL-E	Impressionism	Jul 22, 2024	3D Model	DeepDream	4989.070	Asia	Landscape	Instagram
9	ART-00009	PicassoAI	Realism	Jan 7, 2023	Charcoal	DeepDream	2262.060	Europe	Still Life	Behance
10	ART-00010	DaVinciNet	Impressionism	Sep 13, 2023	Watercolor	DALL-E	1188.630	North America	Abstract	Twitter
11	ART-00011	DALL-E	Impressionism	Sep 5, 2023	Collage	DeepDream	2911.450	Africa	Urban	Dribbble
12	ART-00012	AIArtist123	Minimalism	Jan 24, 2023	Mixed Media	DeepDream	3220.190	North America	Portrait	Flickr
13	ART-00013	PicassoAI	Pop Art	Sep 23, 2023	Digital	DALL-E	531.730	Europe	Landscape	Behance

Figure 3. Data Cleaning

3.3 Exploratory Data Analysis

Data analysis uses Tableau software for data visualization to make the analysis process easier. Some of the analyses obtained are as follows:

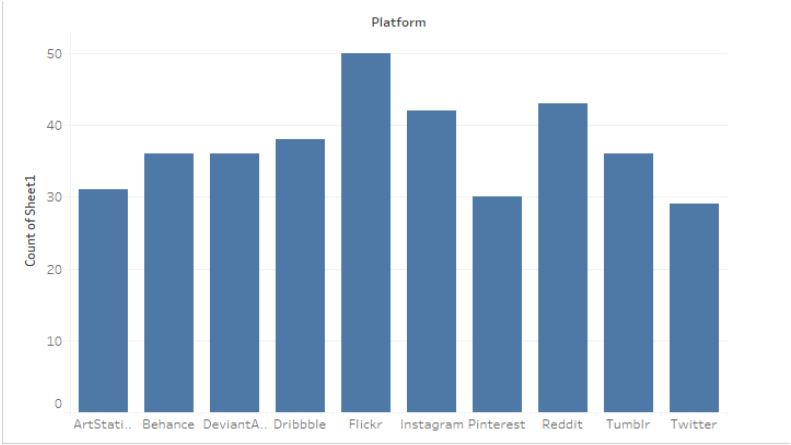

Figure 4. First Exploration Data Analysis

The image above is a tableau visualization that displays several social media platforms used in uploading AI artwork. Judging from the visualization of Figure 4, the most commonly used platform for uploading artworks is Flickr. Flickr is a website for sharing photos and an online community site that is an example of a Web 2.0 application. Known as a popular website for sharing personal photos, this service is utilized by many bloggers as a photo storage place.

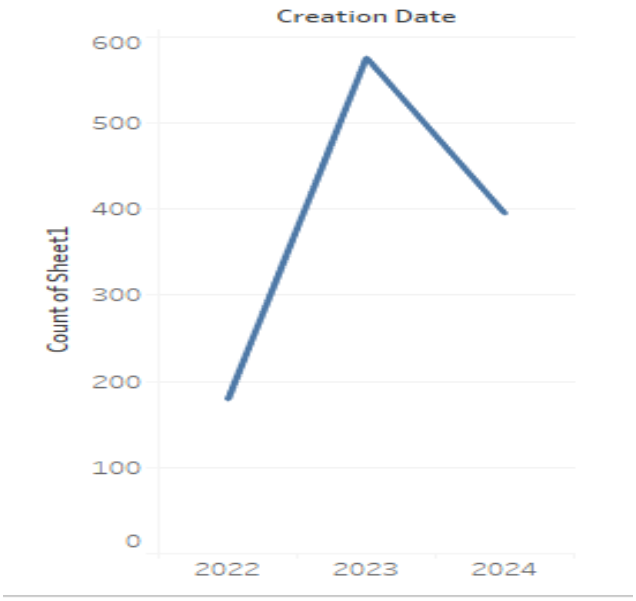

Figure 5. Second Exploration Data Analysis

The image above is a tableau visualization that displays the development of aesthetic trends based on the time the artwork was made. It can be concluded from the data visualization in Figure 5 above that AI art creators have increased rapidly in 2023. The image also shows that the AI trend has existed since 2022, when AI first became popular.

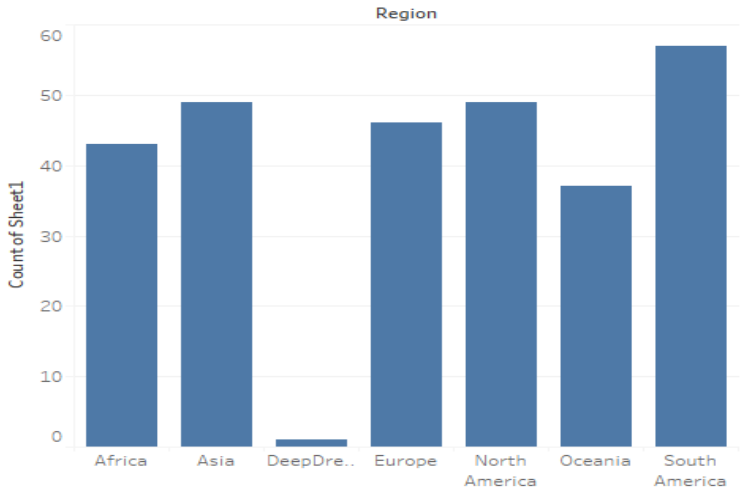

Figure 6. Third Exploration Data Analysis

The image above is a tableau visualization that displays the development of trends in a region based on region or continent. In Figure 6, the majority of continents that use AI in the creation of high-end artworks on the continent or region of South America. This shows that the AI trend in America is growing rapidly there.

3.4 Model Building

Model development is carried out by testing five different algorithms and comparing the algorithms so that the most suitable algorithm is obtained and has high accuracy. The model development uses the RapidMiner application software which can be described as follows.

3.4.1 Naïve Bayes

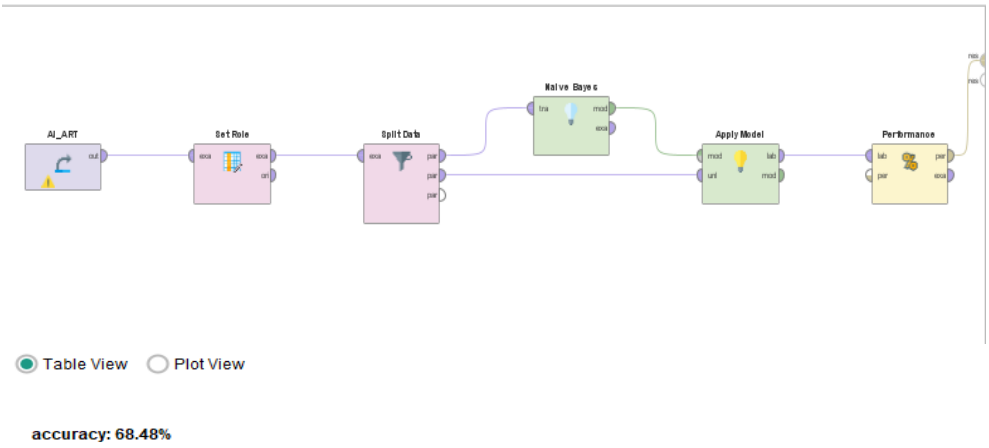

Figure 7. Structure of the Naïve Bayes Algorithm

The first algorithm to be tested using rapidminer is the Naïve Bayes algorithm. The rapidminer structure is as in Figure 7 It began with reading the dataset and then dividing the data as much as 80% as test data and 20% as training data. After that, a hold out method was carried out in which classification had been carried out using the naïve Bayes algorithm so that the accuracy of the data was obtained by 68.48%.

3.4.2 K-Nearest Neighbors

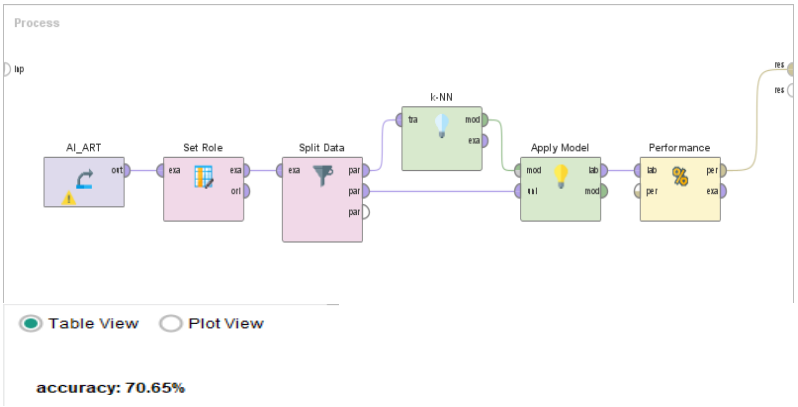

Figure 8. K-Nearest Neighbors Algorithm Structure

The second algorithm is the K-NN (K-Nearest Neighbors) algorithm. The rapidminer structure as shown in Figure 8 begins with reading the dataset and then dividing the data as much as 80% as test data and 20% as training data. After that, classification was carried out using the K-NN algorithm until an accuracy result of 70.65% was obtained.

3.4.3 Random Tree

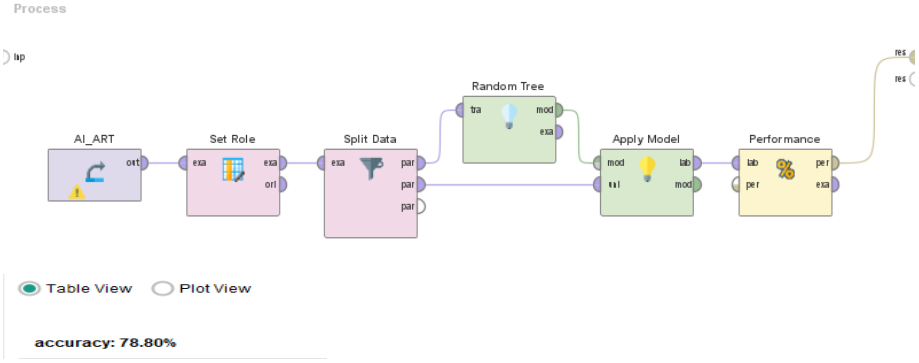

Figure 9. Random Tree Algorithm Structure

The next algorithm to be tested is the Random Tree algorithm. The rapidminer structure as shown in Figure 9 begins with reading the dataset and then divides 80% of the data as test data and 20% as training data. After that, classification was carried out using a random tree algorithm so that an accuracy result of 78.80% was obtained.

3.4.4 Random Forest

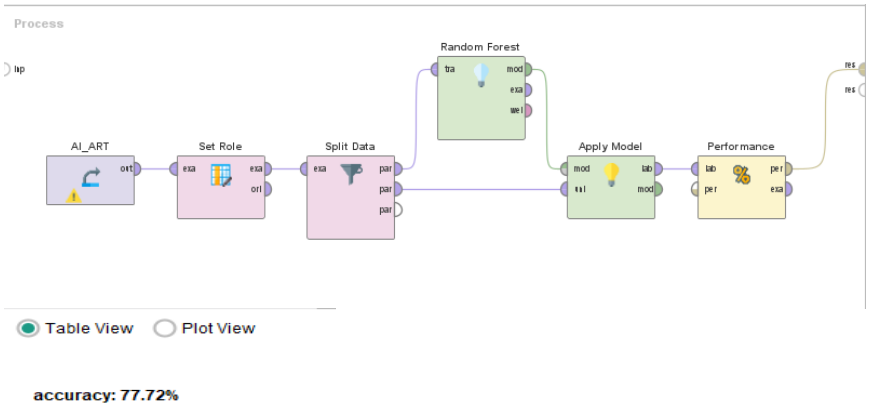

Figure 10. Random Forest Algorithm Structure

The fourth algorithm tested using rapidminer is the Random Forest algorithm. The rapidminer structure is as in Figure 10 It began with reading the dataset and then dividing the data as much as 80% as test data and 20% as training data. After that, classification was carried out using a random forest algorithm which obtained an accuracy of 77.72%.

3.4.5 Deep Learning

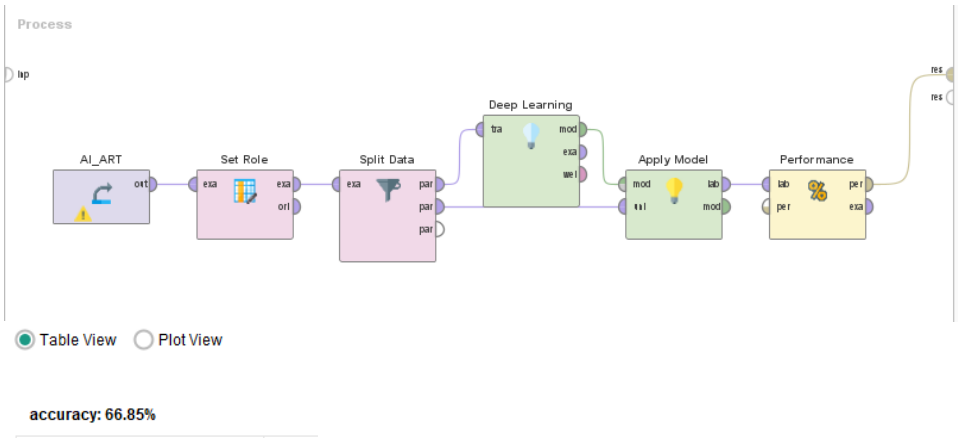

Figure 11. Structure of Deep Learning Algorithms

The last algorithm tested using rapidminer was the Deep Learning algorithm. The rapidminer structure as shown in Figure 11 begins with reading the dataset and then dividing the data as much as 80% as test data and 20% as training data. After that, classification was carried out using a random forest algorithm until an accuracy result of 66.85% was obtained.

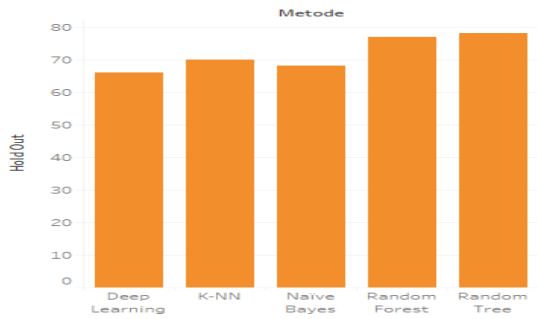

Figure 12. Accuracy Based on Algorithm Comparison

After testing the five algorithms, it was found that the random tree algorithm is the algorithm that has the greatest accuracy and is considered suitable for the purpose of this research. Seen on Figure 12, the random tree algorithm had the highest accuracy compared to the other four algorithms tested in this study with an accuracy rate of 78.80%.

4 Conclusion

The rigor of the research entitled "Evaluation of Aesthetic Trend Prediction of AI Artworks Based on Machine Learning Using the Random Tree Algorithm" succeeded in providing an overview of the ability of the Random Tree algorithm in predicting the aesthetic trend of AI-based artworks. From the results of the evaluation, this algorithm shows an accuracy level of 78.80%.

These results show that Random Tree is a fairly reliable algorithm in capturing patterns and aesthetic characteristics that are trending in AI-based artworks. The performance of this algorithm is affected by various factors, such as the quality of the training data, the representation of the features used, and the complexity of the patterns in the dataset. Overall, this study provides important preliminary evidence regarding the potential of machine learning algorithms, specifically Random Tree, in supporting the development of analytical systems for future aesthetic trends in artwork.

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