

Creative Mind AI: Automated Multimodal Ad Synthesis for Enhanced Brand Engagement.

J. Bhargavi^{*1}, G. Bhanu Prakash^{*2}, J. Chandrabhas^{*3}, N. Naveen Kumar^{*4}

¹Assistant Professor of Department of CSE (AI & ML) of ACE Engineering College, India.

^{2,3,4}Students of Department of CSE (AI & ML) of ACE Engineering College, India.

ABSTRACT

CreativeMindAI is a platform driven by artificial intelligence that enables companies to design creative ads in image form. It also uses DALL·E, an advanced AI model by OpenAI capable of generating high-quality images from text descriptions, ensuring visually appealing and contextually relevant ads. The current AI-powered tools are able to create images or text but do not have a single system to maintain brand consistency and engaged targeting. It also integrates machine learning based audience targeting. The model analyzes factors such as product category, language style, and past consumer engagement data to determine the ideal audience for each ad, ensuring maximum relevance and effectiveness. Unlike existing systems, our AI-driven approach streamlines the entire ad creation process, reducing manual work while improving efficiency. By analyzing product descriptions, it generates high-quality ads that match brand identity and attract the right customers.

Initially, it will focus on image-based ads, with future expansion to video ads.

Keywords : DALL-E , OpenAI.

INTRODUCTION

CreativeMindAI aims to build an AI-powered ad generation system to automate the creation of advertisements using both text and image generation. The system will personalize ad creatives based on specific audience targeting. This is important because it reduces the reliance on manual graphic design, allows brands to rapidly produce multiple ad variations. The project's scope includes taking product names, descriptions, and target audience information as input and generating corresponding advertisement images as output. This will be achieved using Natural Language Processing (NLP) to understand the input context and text-to-image models for the actual ad creation. The final system will be deployed through a user-friendly Flask-based web application interface.

LITERATURE REVIEW

1. Title : Intelligent Advertising using GANs

Author : Aditya A. Rokhade.

Intelligent Advertising explores how Generative Adversarial Networks (GANs) can generate advertisements tailored to user preferences. The authors utilize StyleGAN to produce visually appealing ad images based on categories such as food, fashion, and electronics. They incorporate user intent through conditional inputs, making the generated ads more relevant.

2. Title : Vinci: A Deep Learning Approach to Automate Ad Design

Author : Shunan Guo et al.

The **Vinci** system is an advanced intelligent graphic design tool designed to automate advertisement poster creation using deep learning. It utilizes a sequence-to-sequence Variational Autoencoder (VAE) that treats a poster as a sequence of

design steps involving the background, product, embellishments, and text layers. One of its strengths lies in automating aesthetic layout generation.

3. Title : A study on the automatic generation of banner layouts

Authors : H. Hu, C.Zhang, and Y. Liang

The **Banner Layout Generation** method focuses on improving the visual quality and effectiveness of ad banners by optimizing their layout. This technique blends rule-based logic and machine learning algorithms to place design elements like images, text, and buttons while ensuring proper alignment, spacing, and hierarchy. Its main objective is to reduce "banner blindness" a phenomenon where users subconsciously ignore ads.

4. Title : Alibaba's Ad Generation System

Authors : K. Liu, W. Li, C. Yang, and G. Yang

Alibaba's Ad Generation System is a large-scale industrial solution tailored for e-commerce platforms. It uses deep learning and natural language processing to automatically create ad copies and visuals aligned with user behaviour and product information. The system generates text, selects images, and arranges them in compelling layouts that are customized per user segment. Its biggest strength lies in scalability and personalization, serving millions of products efficiently.

5. Title : A neural representation of sketch drawings

Authors : D. Ha and D. Eck

Sketch-RNN, while not originally designed for advertisement generation, plays a creative role in the design ecosystem. Developed by Google Brain, it's a sequence-to-sequence model that generates human-like sketches based on stroke-by-stroke data. Using a bidirectional LSTM and Gaussian Mixture Model (GMM), it produces vector drawings of objects and abstract shapes.

6. Title : Nima: Neural image assessment

Authors : H. Talebi and P. Milanfar

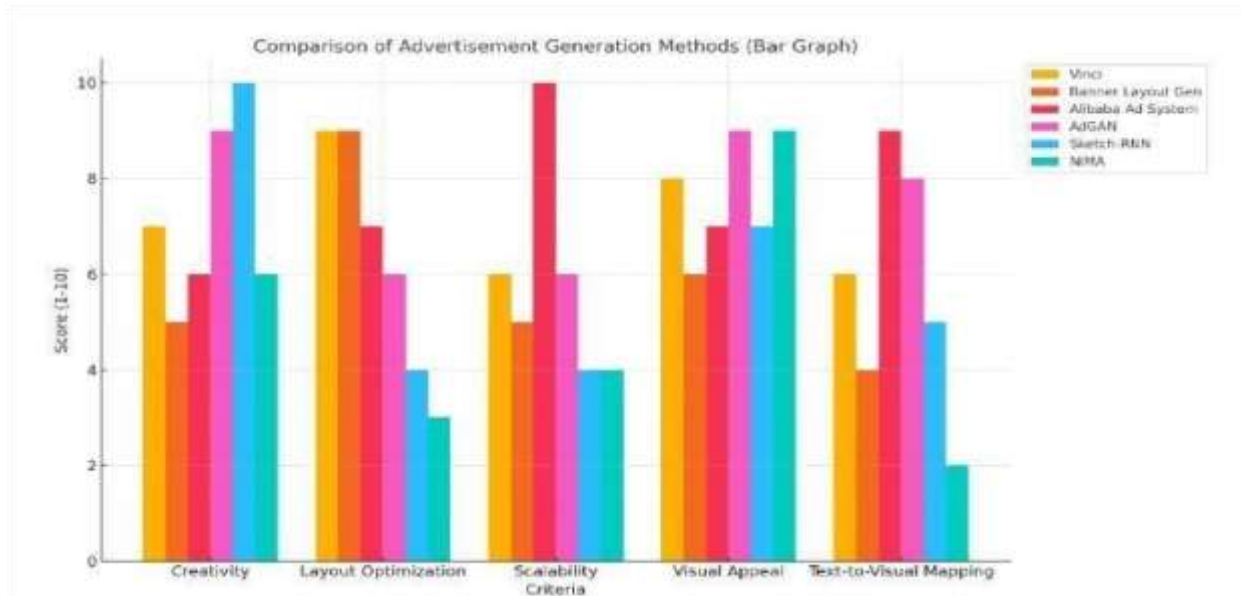
NIMA, or Neural Image Assessment, is a technique employing

convolutional neural networks. It predicts the aesthetic and technical quality of images without needing a reference. Instead of a single score, NIMA outputs a distribution of quality ratings. This approach aims to better align with subjective human perception of image quality. It is a CNN-based model that scores images based on perceived aesthetic quality.

COMPARISON TABLE

S. NO	Title	Authors	Year	Methodology	Strengths
1.	Intelligent Advertising using GANs	Aditya A. Rokhade.	2024	The article uses Seq2Seq VAE, LayoutGAN++, LSTM-RNN, and NIMA for IQA.	This new approach automatically generates ad posters from user input, uses a custom dataset, and ranks outputs by quality.
2.	Vinci: A Deep Learning Approach to Automatic Ad Design	Shunan Guo et al.	2021	The paper uses Seq2Seq VAE(sequence-to sequence), LSTM(Long short-term memory)RNN(Recurrent neural networks), VGG16,and Heatmap Layouts.	End-to-end automatic ad generation with style and layout understanding.
3.	A study on the automatic generation of banner layouts	H. Hu, C. Zhang, and Y. Liang	2021	This approach is done through a Rule-based technique, and sometimes ML-enhanced models.	These techniques ensure balance, alignment, and professional visual hierarchy.
4.	Alibaba's Ad Generation System	K. Liu, W. Li, C.-y. Yang, and G. Yang	2019	The paper employs a clever approach using Deep Learning and understands text using NLP(Natural Language Processing).	The technique makes a Scalable, personalized ad copy and layout based on user behavior.
5.	A neural representation of sketch drawings	D. Ha and D. Eck	2017	The article establishes an Ad generation through handdrawn sketches by using a Sequence-to sequence RNN.	The system can generate creative sketches, useful for visual ideation in ad design.
6.	Nima: Neural image assessment	H. Talebi and P. Milanfar	2018	The article suggests a secure Ad generation through Convolutional Neural Networks (CNNs) and Machine Learning Models.	Predicts aesthetic quality of images; useful for filtering or ranking ad visuals based on visual appeal

Comparison graph:



RESEARCH GAPS

1. Intelligent Advertising using GANs

Lacks in adapting to new trends and doesn't concentrate on the targeted audience.

2. Vinci: A Deep Learning Approach to Automatic Ad Design

Limited flexibility in adapting to new visual themes or trends. Lacks strong integration with user behaviour analytics.

3. A study on the automatic generation of banner layouts

Rule-based approaches can be rigid and not visually innovative. Doesn't use end-to-end deep learning models for design choices.

4. Alibaba's Ad Generation System

Highly tailored to Alibaba's ecosystem, not easily generalizable. Focuses more on text and behaviour than deep layout generation.

5. A neural representation of sketch drawings

Not specifically trained for ads, lacks commercial style consistency. Needs adaptation for ad-focused datasets to improve relevance.

6. Nima: Neural image assessment

Designed primarily for general image aesthetics, not specifically tailored for advertisement objectives like persuasion or branding. Lacks integration with textual or contextual information (e.g., product relevance, audience targeting).

PROPOSED SYSTEM

The suggested system targets the real-time creation of innovative advertisements through the combination of sophisticated computer vision and natural language processing models in order to robotize the process of ad creation from user input. The system starts by gathering user-input data such as product name, description, and target audience through an easy-to-use web interface. The inputs are then processed with the help of NLP methods to identify the context and emotional tone most appropriate for the target audience. After analyzing the content, a dynamic prompt is sent to a pretrained text-to-image diffusion model (e.g., DALL·E) through an API call, which generates an aesthetically pleasing ad creative. The backend, developed in Node.js, is responsible for orchestrating API calls, processing user input, and delivering the generated ad image and copy to the front end.

Conclusion

This project brings with an AI-based solution that automates the advertisement generation process using advanced text and image generative models. It is an affordable, highly scalable, and highly personalized system for businesses and marketers. In a matter of clicks, ads can be made visually stunning in line with special audience segments through minimal manual work, completely revolutionizing promotional content creation.

REFERENCES

- [1] Aditya A. Rokhade and Abishek Deivam, “Intelligent Advertising using GANs” *International Journal of Information Systems and Change Management*, vol. 9, no. 4, 2017, pp. 261–277
 - [2] S. Guo, Z. Jin, F. Sun, J. Li, Z. Li, Y. Shi, and N. Cao, “Vinci: An intelligent graphic design system for generating advertising posters,” in *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, ser. CHI '21. New York, NY, USA: Association for Computing Machinery, 2021.
 - [3] H. Hu, C. Zhang, and Y. Liang, “A study on the automatic generation of banner layouts,” *Computers Electrical Engineering*, vol. 93, p. 107269, 07 2021.
 - [4] K. Liu, W. Li, C.-y. Yang, and G. Yang, “Intelligent design of multimedia content in alibaba,” *Frontiers of Information Technology & Electronic Engineering*, vol. 20, pp. 1657–1664, 12 2019.
 - [5] D. Ha and D. Eck, “A neural representation of sketch drawings,” 2017.
 - [6] H. Talebi and P. Milanfar, “Nima: Neural image assessment,” *IEEE Transactions on Image Processing*, vol. 27, no. 8, p. 3998–4011, Aug. 2018.
- [Online]. Available: <http://dx.doi.org/10.1109/TIP.2018.2831899>.