Social Synergy: Empowering Connections, Amplifying Impact

A Project Report Submitted
In Partial Fulfillment
for award of Bachelor of Technology

in
CSE(AIML)

by

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DECLARATION

We hereby declare that the work presented in this report entitled "**Social Synergy**", was carried out by us. We have not submitted the matter embodied in this report for the award of any other degree or diploma of any other University or Institute. We have given due credit to the original authors/sources for all the words, ideas, diagrams, graphics, computer programs, experiments, results, that are not my original contribution. We have used quotation marks to identify verbatim sentences and given credit to the original authors/sources.

We affirm that no portion of our work is plagiarized, and the experiments and results reported in the report are not manipulated. In the event of a complaint of plagiarism and the manipulation of the experiments and results, we shall be fully responsible and answerable.

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CERTIFICATE

Certified that **Yash Sonkhiya (2001331530187) & Raj Gosain (2001331530136)** have carried out the research work presented in this Project Report entitled "**Social Synergy"** for the award of **Bachelor of Technology**, Artificial Intelligence and Machine Learning from Dr. APJ Abdul Kalam Technical University, Lucknow under our supervision. The Project Report embodies results of original work, and studies are carried out by the students herself/himself. The contents of the Project Report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University/Institution.

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ABSTRACT

In today's fast-paced digital marketing world, social media influencers are evolving alongside Artificial Intelligence (AI) and becoming key players in influencing consumer behaviour and fostering brand engagement across the social platforms. But a new and intriguing trend has surfaced: the ascent of AI-generated virtual influencers (AIVI) which is concealing the boundaries between human and virtual interaction. Examples like Lil Miquela (United States), Imma (Japan), and Rozy (Korea) exemplify the global impact of these computer-generated personas in influencer marketing. This paper aims to explore the evolution process, creation process, impact, and ethical considerations surrounding AIVI in marketing campaigns. By synthesizing existing literature, the review aims to provide valuable insights into the implications of AIVI on digital media, marketing practices, and societal dynamics. Specifically, examining how AIVI have the potential to revolutionize marketing strategies which can offer highly personalized content and immersive brand experiences to customers. Yet, ethical concerns which are associated with the authenticity, transparency, and algorithmic bias of AIVIs must be addressed to ensure responsible integration into marketing practices. By delving into these ethical considerations, the review aims to contribute towards a broader understanding of the ethical implications of these AIVI in the digital marketing landscape. These AIVI present a promising future for brands to engage with consumers effectively in the ever-evolving digital landscape of marketing. However, the ongoing research and ethical scrutiny are essential for harnessing the full potential of these AIVI while mitigating the potential risks and concerns which are associated with them.

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LIST OF ABBREVIATIONS

Abbreviation	Full Form
AI	Artificial Intelligence
AIVIs	Artificial Intelligence Generated Virtual Influencers
AWOM	Algorithmic Word of Mouth
EDA	Exploratory Data Analysis
EWOM	Electronic Word of Mouth
HIs	Human Influencers
LLMs	Large Language Models
SRS	Event Adversarial Neural Network
IDE	Integrated Development Environment
KPI	Key performance Indicator
CSV	Comma Separated Values
CGI	Computer Generated Images
SRS	Software Requirement Specification
UX	User Experience
UI	User Interface
UAT	User Acceptance Testing
WBS	Workflow Breakdown Structure
VIs	Virtual Influencers

CHAPTER - 1

INTRODUCTION:

Social media influencers have become a cornerstone of modern marketing, often heralded as the 'new brand' due to their pervasive influence (Weinswig, 2016). However, a novel phenomenon has emerged in recent years, elevating the concept of influencer marketing to new heights – the advent of virtual artificial intelligence (AI) influencers, also known as AI-generated virtual influencers (Leighton, 2019; Thomas and Fowler, 2021). These AI generated virtual influencers (AIVI) employ sophisticated algorithms to craft computer generated personas that engage with users across various social media platforms, cultivating dedicated followings. Research has demonstrated the significant impact of virtual influencers (VIs) on consumer behaviour and attitudes within the digital landscape. Studies indicate that VIs are perceived as trustworthy, reliable, and relatable figures, fostering increased purchase intentions among consumers (M. Gerlich, 2023). Furthermore, VIs excels in promoting products and services by weaving captivating narratives and delivering visually striking content that resonates with audiences (D. Jiménez, 2019). The prospects for AIVI are undeniably promising, offering vast potential for growth and innovation in digital marketing and consumer engagement. By harnessing AI technologies, AIVI have the capacity to deliver highly personalized content and interactions, thereby enhancing engagement and fostering brand loyalty (M. Gerlich, 2023). Through the creation of immersive brand experiences and compelling narratives, AIVI stand poised to revolutionize marketing strategies and captivate audiences in unprecedented ways (A. Belova, 2021).

1.1 OBJECTIVES:

The primary aim of this review paper is to furnish a nuanced understanding of AIVI and their ramifications on digital media, marketing practices, and societal dynamics. By synthesizing existing literature, discerning key trends, and elucidating potential future trajectories, this paper seeks to enrich the ongoing discourse surrounding VIs, while informing subsequent research initiatives and industry strategies.

1.2 Motivation:

The burgeoning prominence of AIVI in marketing campaigns underscores the necessity for a comprehensive exploration of their development, implications, and prospects. This review endeavours to delve into the evolution and creation process of virtual influencers, dissecting their persona design, evaluating metrics and measures of success, addressing ethical considerations, and assessing their impact on various industries. By doing so, this paper aims to provide valuable insights for researchers, practitioners, and policymakers alike.

CHAPTER – 2

LITERATURE REVIEW

2.1 Evolution of AI-generated influencers:

The evolution of AI-generated influencers is a significant trend influenced by advances in artificial intelligence and natural language processing (N. L. Williams, 2019). Researchers have proposed adaptive agent-based evolutionary approaches to identify influencers in online social networks, demonstrating superior performance in maximizing influence (W. Li, Q. Bai, 2019). The history and evolution of AI and machine learning have been analysed to understand the impact and leadership dynamics in the field, shedding light on AI's development over the years (R. B. Audibert, 2022). Genetic algorithms have been utilized to evolve AI players for real-time strategy games, showcasing the production of innovative and robust strategies through co-evolution (C. Miles, J. Quiroz, 2007). Furthermore, the improvement of generative language models has enabled the automation of creating convincing and misleading text for influence operations, posing new challenges and threats that require mitigation strategies (J. A. Goldstein, 2023). Due to its relative nascence, efficient research about VIs is a recent phenomenon. Existing scholarly discourse on VIs notes that with technological advancements, VIs is difficult to distinguish from Human Influencers (HIs) in their social media activities and play a comparable promotional role in advertising (Hofeditzetal.,2022).

As AI technology advances, the emergence of computer-generated avatars and VIs has gained popularity in social media, shaping consumer attitudes and behaviours (R. B. Audibert, 2022). Additionally, the rise of algorithmic word of mouth (aWOM) generated by AI tools is displacing traditional forms of influence like electronic word of mouth (eWOM) (N. L. Williams, 2019). Furthermore, the use of Computer-generated Imagery (CGI) influences luxury fashion brands showcases the evolving nature of influencer marketing, blending relatability and exclusivity to promote brands effectively (G. White and Lubna Nafees, 2022). These trends highlight the transformative impact of AI on influencer marketing, indicating a shift towards more technologically driven and AI generated forms of influence in the digital landscape.

Fig. 1 Evolution of AI generated Virtual Influencers

2.2 Creation of AI Influencer:

To fabricate an AI-generated virtual influencer, harnessing the advancements in generative language models is imperative. These models utilize AI technologies to craft a fictitious computer-generated personality imbued with lifelike human attributes and traits (T. Chesney and H. Noke, 2008). Research underscores that AI influencers possess comparable effectiveness to human counterparts in captivating consumer interest, although potentially facing lower levels of trust (S. Sands, 2022). Moreover, leveraging large language models (LLMs) such as ChatGPT can reinforce personalized persuasion by tailoring messages to recipients' psychological profiles, thereby significantly enhancing influence (M. Xu et al, 2023). This strategy entails devising of a generative AI-powered framework for achieving the physical-virtual synchronization within the vehicular Metaverse, wherein AI models can furnish personalized augmented reality recommendations predicated on user preferences (S. Matz, 2023). By integrating these insights, a compelling AI-generated virtual influencer can be fashioned, one that resonates with audiences and adeptly fosters engagement.

To create an AI-generated virtual influencer, one must consider key components of the influencer's identity, the emotional appeal towards different types of virtual influencers, and the factors that attract followers to these digital beings. Understanding the relational dimensions and perceived identity of virtual influencers is crucial in developing their character and engagement strategies (P. Rodrigues, 2023). Followers are drawn to virtual influencers due to their visual appeal, sense of mystery, and creative storytelling, which differentiate them from human influencers and allow for innovative digital content creation (A. Choudhry ,2022). By leveraging these insights, one can strategically design and promote an AI-generated virtual influencer to optimize digital marketing strategies.

2.3 Impact of AI generated virtual influencer:

AIVIs can gain traction in the influencer marketing industry, causing a potential challenge to human influencers. Recent Research indicates that the VIs offers benefits like full control over content, cost savings, and flexibility in brand campaigns (P. Rodrigues, 2023) which is a shortcoming for HI. Virtual influencers like Lil Miquela were able to gain significant popularity on social media platforms like Instagram. They can effectively engage with followers through motivations like novelty, entertainment, and aesthetics (A. Laszkiewicz, 2023). They are seen as authentically fake, with curated flaws helping to mitigate the uncanny valley effect (Frida Cerna Neri, 2022). Additionally, AI influencers utilizing warm colours in their posts on social media platforms elicit more favourable consumer responses, with brightness moderating this effect (S. Fauser, 2023). Virtual influencers have been noted for their ability to build brand image and boost brand awareness, although they may struggle to incite purchase intention due to perceived lack of authenticity and weak parasocial relations with followers (C. Lou, S. Ting, 2022).

2.4 Ethical consideration:

Ethical considerations surrounding the use of AI for creation of VIs, particularly in terms of authenticity and transparency, is very much crucial. The development of AI systems like ChatGPT and Large Language Models (LLMs) have raised concerns about bias, privacy, accountability, and transparency (D. Gaud, Aisha Zahid Huriye, 2023). Additionally, the European Union's draft AI Act prohibits AI systems from using subliminal techniques that could harm individuals, emphasizing the need for responsible and ethically aligned AI innovation (Juan Pablo, 2023). Furthermore, the debate on algorithmic transparency and explainability highlights the importance of understanding the mechanisms behind AI behaviour to ensure ethical practices, even considering the emerging area of deceptive AI agents for effective human interaction (K. Rogers and A. Howard, 2023). Balancing transparency, authenticity, and ethical guidelines is essential for the responsible integration of AI technologies into society. AI-generated virtual influencers have shown effectiveness in promoting products or services compared to traditional influencers (L. Luo, Ka Wing Chan, Laili Muttamimah, 2023).

Additionally, AI influencers offer benefits such as generate custom content in large scale and post on different platform in single click and provide flexibility with time and cost for brand campaigns (Jeenisha Shrungare, 2023). However, challenges exist, as some consumers express reservations about the authenticity of AI influencers. Despite this, AI influencers are seen as a

growing trend in marketing communication practices, with the potential for continued growth in the future. Overall, AIVI present a promising possibility for brands to engage with consumers and promote products effectively over social media platforms.

2.5 Future scope:

In the future, AI-generated virtual influencers could revolutionize marketing strategies by leveraging advanced persuasive capabilities and anthropomorphic designs. These virtual influencers, like Ling in China, can build personas on social media, influence consumer perceptions, and implement marketing strategies effectively (J. A. Goldstein, 2023). With the ability to create personalized persuasion at scale, AI-driven virtual influencers may significantly impact how brands engage with audiences, potentially leading to a loss of human control over information environments (M. Burtell, 2023). Despite the potential negative responses from audiences due to the uncanny valley effect, AI-generated virtual influencers offer brands a promising tool for promoting products with ease and efficiency (M. Burtell, 2023). As these technologies evolve, proactive measures such as truthful AI and legal remedies may be necessary to mitigate any detrimental effects of persuasive AI systems (L. Luo and W. Kim, 2023).

AI virtual influencers can significantly impact marketing strategies by enhancing consumer engagement and trust (A. Laszkiewicz,2023 and G. Luca, 2024). Research indicates that the presence of companions in virtual influencer posts increases their impact by making them appear more human and trustworthy, ultimately influencing consumer perceptions positively (G. Luca, 2024). Moreover, virtual influencers, being AI-generated, offer brands the flexibility to reach consumers without physical restrictions, especially crucial during events like the COVID-19 pandemic (H.-J. Lee, 2022). By leveraging AI technology, companies can segment consumer markets based on factors like attractiveness and trustworthiness of virtual influencers, leading to more targeted and effective marketing strategies (M. Shaik, 2023). Integrating AI into marketing through virtual influencers not only enhances performance but also provides a competitive advantage in the dynamic business landscape.

CHAPTER – 3

REQUIREMENTS AND ANALYSIS

3.1 Requirements Specification:

The "Social Synergy" project necessitates a meticulous delineation of its requirements to ensure precise alignment with its objectives and functionalities. This section meticulously outlines the specific needs and functionalities of the project, encompassing various facets essential for its successful execution.

1. Data Sources

The cornerstone of the project lies in the dataset extracted from The Good Creator Co website utilizing the Web Scraper tool. This dataset embodies both demographic information and performance metrics of individual influencers across social media platforms such as Instagram and YouTube. This comprehensive dataset serves as the bedrock for insightful analysis and informed decision-making throughout the project lifecycle.

2. Data Cleaning and Transformation

Upon acquisition, the dataset undergoes a meticulous process of cleaning and transformation within the Google Colab environment to ensure its efficacy and suitability for analytical endeavours. This process encompasses the removal of extraneous columns irrelevant to the analysis, elimination of empty rows and columns, and the mitigation of outliers and duplicate values through Python-based techniques. After cleaning, strategic transformations are applied to certain data types and performance metrics, facilitating a streamlined analysis process. This culminates in a refined dataset primed for Exploratory Data Analysis (EDA) to extract meaningful insights.

3. Research and Analysis

A robust foundation of research underpins the project's analysis endeavours, encompassing a comprehensive exploration of influencers, brands, their respective industries, and the intricacies of collaboration and engagement processes. Furthermore, in-depth investigations into User Experience (UX) and User Interface (UI) paradigms inform the design of both the dashboard and website components. Concurrently, an exhaustive analysis of contemporary trends and methodologies within influencer marketing, including advancements like AI-generated content and virtual influencers, enriches the project's contextual understanding and analytical capabilities.

4. Dashboard

To facilitate seamless visualization and interpretation of insights gleaned from the dataset, a sophisticated dashboard is developed leveraging Microsoft Power BI. This dashboard serves as a dynamic interface, enabling stakeholders to intuitively navigate various graphs and charts, thereby elucidating prevailing market trends and elucidating the efficacy of AI-generated virtual influencers across social media platforms. Key metrics and performance indicators are prominently displayed, empowering stakeholders with actionable intelligence to inform strategic decisions.

5. Website Integration

In tandem with dashboard development, a cohesive web platform is constructed to bridge the gap between influencers and brands, fostering collaboration and promotional endeavours within the influencer marketing landscape. Through user-friendly account creation and management features, influencers, and brands gain access to a suite of services facilitating seamless collaboration and performance analysis. This integrated platform serves as a catalyst for enhanced efficiency and efficacy in influencer-brand engagements, equipping stakeholders with invaluable insights to drive informed decision-making.

3.2 Planning and Scheduling:

The Planning and Scheduling phase is a crucial iterative process that involves organizing tasks and allocating resources to ensure the timely completion of the project. It encompasses various schedules aimed at delineating clear milestones and objectives throughout the project lifecycle:

1. **Ideation and Initiation:**
    - Identification and selection of the area of interest and project topic.
    - Defining project objectives, motives, and constraints.
    - Selection of the appropriate technology stack and tools.
    - Defining the project life cycle and processes to be followed.
    - Brainstorming sessions to generate ideas and concepts.
    - Initial data modelling to outline the structure and scope of the project.
2. **Planning and Defining:**
    - Defining the scope of work and processes to be executed.
    - Creating a comprehensive work breakdown schedule (WBS) outlining tasks and subtasks.
    - Collection and evaluation of the dataset for analysis.

- Cleaning and transforming the dataset to ensure data integrity.
- Initiating research on user experience (UX) and designing principles for the dashboard.
- Regular creation of weekly progress reports and presentations.
- Drafting the Software Requirements Specification (SRS) document outlining project specifications.

3. **Development and Execution:**
    - Conducting Exploratory Data Analysis (EDA) on the pre-processed dataset.
    - Reporting and analysing insights gained from the data.
    - Continuing research and analysis on website development and emerging market trends.
    - Prototyping the dashboard and website interfaces for initial feedback and evaluation.
4. **Performance Control:**
    - Development of the website according to design specifications.
    - Creation and refinement of the dashboard to meet user requirements.
    - Crafting a comprehensive review paper summarizing project progress and findings.
    - Generating reports detailing project performance and outcomes.
5. **Testing and Improvement:**
    - Thorough testing of the website and dashboard functionality based on user and stakeholder expectations.
    - Identifying and developing new key performance indicators (KPIs) and metrics.
    - Conducting research on AI-generated virtual influencers and their impact on the market.
6. **Documentation:**
    - Finalizing the project report and review paper with all necessary documentation.
    - Formatting and commenting code for clarity and future reference.
    - Improving dashboard and website design based on feedback and usability testing.

3.3 Software and Hardware Requirements:

Identifying the necessary software and hardware ensures compatibility and smooth project execution. The requirements for this project include:

1. **Software Tools:**

- Microsoft Power BI: Used for intuitive dashboard creation, enabling visualization of data insights.
- Figma: Employed for designing captivating and user-friendly User Experience (UX) and User Interface (UI) elements.
- Microsoft Excel: Utilized for efficient data preprocessing, manipulation, and analysis.
- Visual Studio Code: The primary Integrated Development Environment (IDE) for website development, offering features for coding and debugging.
- Google Colab Studio: Leveraged for Python-based analysis, including Exploratory Data Analysis (EDA) and machine learning model development.
- Web Scraper: Utilized for efficient extraction of data from websites, facilitating the acquisition of relevant datasets.

2. **Programming Languages:**

- Python: Employed for various analytical tasks, including EDA, machine learning, and scripting.
- HTML, CSS, and JavaScript: Utilized for frontend website design and development, ensuring an interactive and visually appealing user experience.

3. **Hardware:**

- Standard computer or laptop equipped with sufficient processing power and memory to handle the demands of software tools and development environments.
- Stable internet connectivity is essential for accessing online resources, collaborating with team members, and conducting research seamlessly.

3.4 Preliminary Product Description:

This section offers a preliminary glimpse into the envisioned product, shedding light on its key components and functionalities:

1. **UX/UI Figma Design:**

   The foundation of our project begins with the thoughtful design of both the website and dashboard interfaces, meticulously crafted using Figma. Through extensive research and analysis of various design paradigms, we aimed to create intuitive and visually

compelling user experiences. These designs serve as blueprints for development, ensuring seamless navigation and usability for end-users.

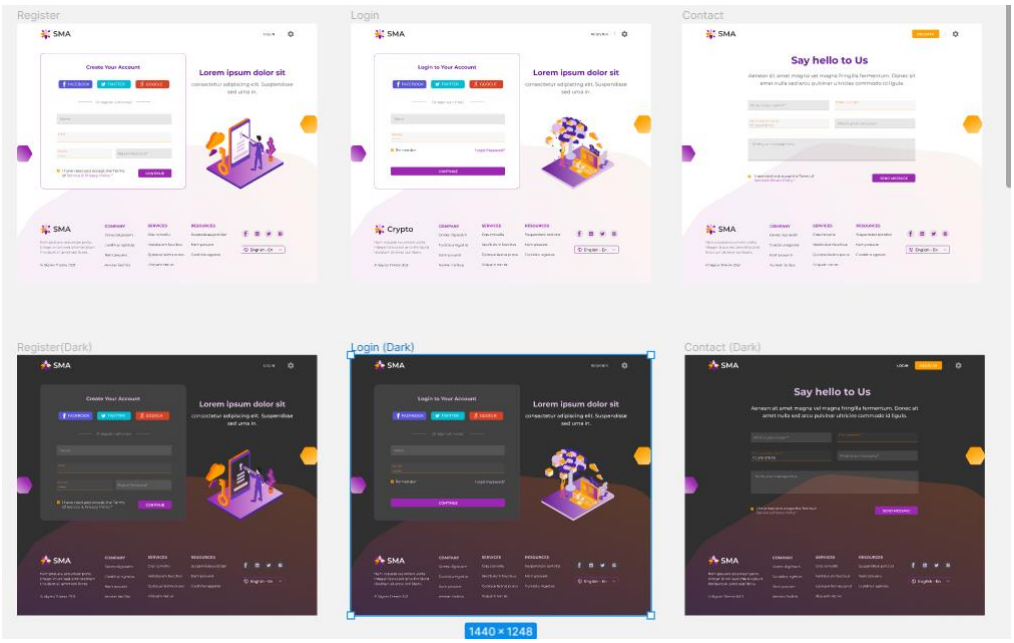

Fig 2. Website Ui Design

2. Website Integration:

The website acts as a vital bridge, connecting influencers and brands to facilitate effortless collaboration and campaign management. Beyond bridging this gap, it fosters a collaborative community where aspiring influencers and emerging brands can come together to explore marketing strategies and best practices. By providing a platform for shared learning and growth, the website empowers individuals and entities to navigate the dynamic landscape of influencer marketing with confidence and ease.

Fig. 3 Social Synergy Website

3. Dashboard Designing:

At the core of our product lies the dashboard, a powerful tool for extracting insights from the wealth of data collected. Designed to offer a comprehensive overview of influencer performance across platforms such as Instagram and YouTube, the dashboard empowers brands with actionable intelligence. By visualizing key metrics and trends, it equips decision-makers with the knowledge needed to evaluate influencers, understand their audiences, and assess their performance across diverse projects. With the dashboard as their compass, brands can navigate the complexities of influencer marketing with clarity and precision.

Fig. 4 Influencer analysis Dashboard

CHAPTER – 4

PROPOSED METHODOLOGY

The methodology for the "Social Synergy" project outlines a structured approach to developing a comprehensive influencer marketing platform. This methodology is divided into several key phases: Data Collection and Cleaning, Exploratory Data Analysis (EDA), Dashboard Development, Website Development, and Integration and Testing.

4.1 Data Collection and Cleaning

Data Sources:

The primary dataset for this project will be collected using a web scraper. This dataset includes demographic data and performance metrics of individual influencers on social media platforms such as Instagram and YouTube.

Data Cleaning:

The collected data, initially in CSV format, will be imported into Google Colab for cleaning and transformation.

- Cleaning processes will include:
- Removal of irrelevant columns and empty rows/columns.
- Deletion of outliers and duplicate values using Python.
- Transformation of data types for consistency.
- Merging of similar categories to simplify analysis.

4.2 Exploratory Data Analysis (EDA)

Objectives:

- To uncover patterns, trends, and insights within the cleaned dataset.
- To identify key metrics that influence the success of influencers.

Tools and Techniques:

- Python and its libraries (such as Pandas, NumPy, and Matplotlib) will be used in Google Colab for performing EDA.
- Visualization techniques will be applied to represent data insights graphically.

4.3 Dashboard Development

Objectives:

- To create an interactive dashboard that visualizes influencer data and performance metrics.

Tools and Techniques:

- Microsoft Power BI will be utilized for dashboard creation due to its powerful data visualization capabilities.
- The dashboard will include various charts, graphs, and filters to enable users to interact with the data and gain insights.

4.4 Website Development

Objectives:

- To develop a platform that facilitates collaboration between influencers and brands.

Tools and Techniques:

- Figma will be used for UX/UI design to ensure an intuitive and user-friendly interface.
- The website will be developed using HTML, CSS, and JavaScript in Visual Studio Code.
- Key features will include user registration, profile management, and campaign management tools.

4.5 Integration and Testing

Objectives:

- To integrate the dashboard with the website and ensure seamless functionality.
- To test the platform for usability, performance, and reliability.

Tools and Techniques:

- Comprehensive testing will be conducted to identify and resolve any issues.
- Feedback will be collected from potential users to improve the platform.

Testing Phases:

- Unit Testing: Each component of the dashboard and website will be tested individually.
- Integration Testing: Ensuring that the dashboard integrates smoothly with the website.

- User Acceptance Testing (UAT): Final testing by end-users to ensure the platform meets their needs and expectations.

4.6 Iterative Improvement

Objectives:

- To continuously refine the platform based on user feedback and technological advancements.

Approach:

- Regular updates and improvements will be made to enhance functionality, user experience, and data accuracy.
- New features will be added based on emerging trends in influencer marketing and user requirements.

This methodology provides a systematic approach to developing the "Social Synergy" platform, ensuring that all aspects from data collection to final integration are meticulously planned and executed. By following these steps, we aim to create a robust, user-friendly, and insightful platform that bridges the gap between influencers and brands, enabling more effective and data-driven collaborations.

CHAPTER – 5

RESULT

The development and deployment of the "Social Synergy" project yielded several key results that highlight the effectiveness and potential of our influencer analysis dashboard and website integration. The results are categorized into data insights, dashboard utility, and website functionality, each demonstrating significant advancements in our objectives.

1. **Data Insights:**

   Through the extensive process of data collection, cleaning, and transformation, we gathered a comprehensive dataset from the Good Creator Co. website. This dataset included demographic data and performance metrics of individual influencers across platforms such as Instagram and YouTube. The Exploratory Data Analysis (EDA) phase revealed several noteworthy trends and patterns:

   1. **Influencer Demographics:** Our analysis identified the predominant demographics of successful influencers, including age groups, geographic locations, and follower engagement rates. For instance, influencers aged 18-24 showed the highest engagement rates, particularly those based in urban areas with diverse audiences.
   2. **Platform Performance:** The data indicated varying performance metrics between Instagram and YouTube. Instagram influencers tended to have higher engagement rates through stories and posts, while YouTube influencers excelled in long-form content, generating substantial view counts and watch times.
   3. **Content Type and Engagement:** We discovered that certain types of content, such as tutorials and behind-the-scenes footage, garnered higher engagement rates. This insight is valuable for brands looking to maximize their reach through specific content strategies.

2. **Dashboard Utility:**

   The dashboard created using Microsoft Power BI proved to be a powerful tool for visualizing and analysing the collected data. Key features and benefits of the dashboard include:

   1. **Interactive Visualizations:** The dashboard offers a variety of interactive charts and graphs that allow users to explore data dynamically. Brands can filter data based on specific criteria, such as influencer location or content type, to gain tailored insights.

2. **Performance Metrics:** Detailed performance metrics for each influencer, including follower growth, engagement rates, and content performance, are easily accessible. This helps brands to make informed decisions when selecting influencers for their campaigns.
3. **Trend Analysis:** The dashboard provides trend analysis features, showcasing how influencer performance evolves over time. This is particularly useful for identifying emerging influencers and monitoring the effectiveness of ongoing campaigns.

3. Website Functionality:

The website component of the project, developed using HTML, CSS, and JavaScript, successfully bridges the gap between influencers and brands, facilitating efficient collaboration and campaign management. Key functionalities of the website include:

1. **User Registration and Profiles:** Influencers and brands can create detailed profiles, providing information about their interests, previous collaborations, and performance metrics. This fosters transparency and helps in matching the right influencers with suitable brands.
2. **Campaign Management:** The website includes tools for creating, managing, and tracking marketing campaigns. Brands can set campaign objectives, monitor progress, and evaluate results in real-time.
3. **Community Features:** The platform encourages community building through forums and discussion boards where influencers and brands can share experiences, tips, and insights. This feature enhances learning and networking within the influencer marketing community.

CHAPTER – 6

CONCLUSION AND FUTURE WORK

CONCLUSION:

The "Social Synergy" project has successfully developed a comprehensive platform designed to revolutionize the influencer marketing landscape. By integrating advanced data analysis with intuitive user-centric design, we have created tools that empower brands and influencers to collaborate more effectively and make data-driven decisions.

Our project journey began with extensive data collection and preprocessing, where we meticulously gathered and cleaned data from influencers' performance metrics on platforms like Instagram and YouTube. This foundational step ensured the integrity and reliability of the insights derived. Through Exploratory Data Analysis (EDA), we uncovered valuable trends and patterns, such as the demographic profiles of high-engagement influencers and the types of content that resonate most with audiences. These insights are critical for brands seeking to maximize their marketing impact.

The creation of a dynamic, interactive dashboard using Microsoft Power BI was a cornerstone of our project. This dashboard provides a powerful tool for visualizing and analysing influencer data, offering brands a clear view of key performance indicators and trends. The ability to filter and interact with the data allows users to tailor their insights to specific needs, enhancing decision-making processes.

Our website, developed with HTML, CSS, and JavaScript, bridges the gap between influencers and brands, facilitating seamless collaboration and campaign management. With features like user registration, detailed profiles, and campaign management tools, the website fosters a collaborative community where influencers and brands can thrive. The inclusion of community features further enhances this platform, encouraging knowledge sharing and networking.

In conclusion, "Social Synergy" exemplifies the potential of combining data analytics with user-friendly design to advance the field of influencer marketing. Our platform not only streamlines the process of finding and managing influencer partnerships but also provides actionable insights that drive successful marketing strategies. As the influencer marketing landscape continues to evolve, "Social Synergy" positions itself as a vital tool for brands and influencers aiming to stay ahead of the curve.

FUTURE WORK:

The "Social Synergy" project has established a robust framework for influencer marketing analytics and collaboration. To enhance its functionality and broaden its impact, several future development paths are recommended:

1. Integration of Additional Social Media Platforms:

- Expanding data collection to encompass more social media platforms such as TikTok, Twitter, and Facebook will provide a more comprehensive analysis of influencer performance and audience engagement, aiding brands in making well-rounded marketing decisions.

2. Advanced Predictive Analytics:

- Implementing machine learning models to predict influencer performance and campaign success can offer brands foresight into future trends. Predictive analytics can help identify emerging influencers and optimize campaign strategies based on projected outcomes.

3. Sentiment Analysis:

- Incorporating sentiment analysis tools to assess audience reactions to influencer content can offer deeper insights into the effectiveness of marketing campaigns. Understanding the sentiment behind comments and interactions can help brands refine their messaging and content strategies.

4. AI-Driven Content Suggestions:

- Developing AI algorithms to suggest content ideas and strategies based on current trends and audience preferences can assist influencers in creating more engaging and relevant content, thereby enhancing the quality and impact of influencer marketing efforts.

5. Enhanced User Engagement Features:

- Introducing more interactive features on the website, such as live chat support, Q&A forums, and webinars, can foster a more engaged community. These features can facilitate real-time collaboration and knowledge sharing among influencers and brands.

6. Mobile Application Development:

- Creating a mobile application for the platform can increase accessibility and convenience for users. A mobile app would allow influencers and brands to manage their profiles, campaigns, and insights on the go, making the platform more versatile.

7. Automated Campaign Performance Reports:

- Implementing automated report generation for campaign performance can save time and provide consistent, detailed insights. These reports can be scheduled to deliver regular updates to brands and influencers, keeping them informed about their progress and areas for improvement.

8. Global Market Insights:

- Expanding the platform's reach to include global market insights can help brands and influencers understand and tap into international markets. Analysing global trends and audience behaviours can provide valuable information for scaling marketing efforts.

9. Enhanced Security and Privacy Features:

- Strengthening data security and privacy measures will ensure the protection of sensitive information. Implementing advanced encryption and compliance with international data protection regulations can enhance user trust and platform reliability.

10. Customization and Personalization:

- Allowing for greater customization and personalization of the dashboard and website features can improve user experience. Tailoring the interface to meet individual user needs and preferences can increase user satisfaction and engagement.

By pursuing these future developments, the "Social Synergy" platform can continue to evolve and maintain its position as a leading tool in the influencer marketing industry, offering even more value to its users.

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APPENDICES

1. **Dataset used:** Raw_Dataset.csv
   (https://github.com/ysonkhiya122/SocialSynergy/blob/main/Dataset/Raw_Dataset.csv)
2. **Exploratory Data Analysis:**

Introduction to EDA

The main objective of this program is to cover the steps involved in Data pre-processing, Feature Engineering, and different stages of Exploratory Data Analysis, which is an essential step in any research analysis. Data pre-processing, Feature Engineering, and EDA are fundamental early steps after data collection. Still, they are not limited to where the data is simply visualized, plotted, and manipulated, without any assumptions, to assess the quality of the data and building models. This program will guide you through data pre-processing, feature engineering, and EDA using Python.

Steps for performing EDA with Python

1. **Data Collection**: Gather the relevant data from various sources such as databases, APIs, or files. This step involves compiling all the necessary information for analysis.
2. **Data Cleaning**: Identify and handle missing, incomplete, or erroneous data. Cleaning involves tasks like imputation, removing duplicates, and dealing with outliers to ensure data quality.
3. **Data Exploration**: Perform initial exploration to understand the structure, patterns, and relationships within the data. This step involves summary statistics, visualizations, and identifying potential trends or anomalies.
4. **Feature Engineering**: Create new features or transform existing ones to improve model performance. Feature engineering aims to extract relevant information from the data and enhance its predictive power.
5. **Data Visualization**: Utilize graphs, charts, and plots to visually represent the data. Visualization aids in understanding complex relationships and patterns that may not be apparent from raw data alone.
6. **Statistical Analysis**: Apply statistical techniques to gain deeper insights into the data. Statistical analysis helps in hypothesis testing, assessing correlations, and making inferences about the population from the sample.
7. **Documentation and Reporting**: Document the findings, methodologies, and insights obtained from the analysis. Reporting involves communicating results effectively to stakeholders through reports, presentations, or dashboards.

Data Collection:

The data utilized in this project was gathered through web scraping techniques employing a web scraping tool available at Chrome Web Store from the website goodcreator.co.

- Columns related to YouTube links and Instagram links seem to have no useful data.
- **After data cleaning, the dataset contains 3299 entries and 15 columns.**

Data Exploration:

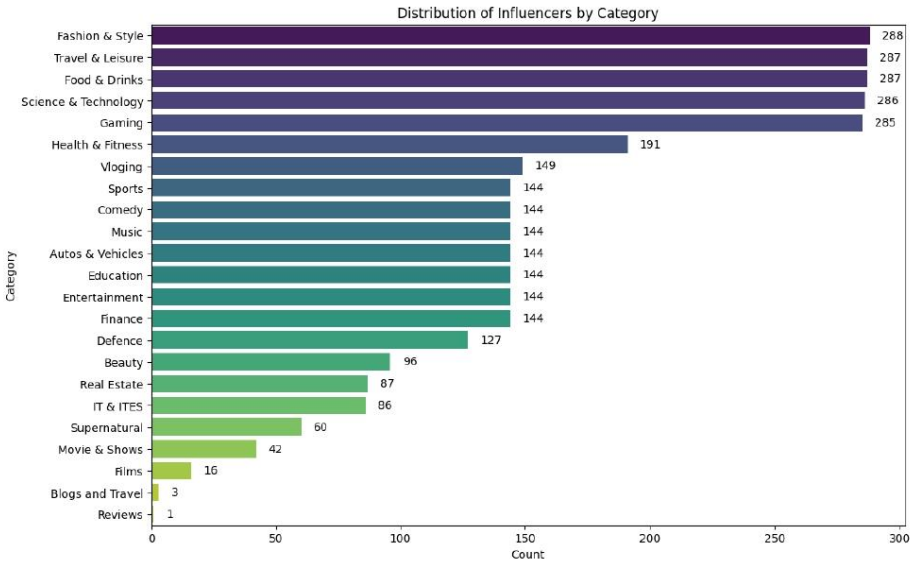
```
category_counts = data['Category'].value_counts()

# Sort categories by frequency
sorted_categories = category_counts.index

plt.figure(figsize=(12, 8))
sns.countplot(y='Category', data=data, order=sorted_categories,
palette='viridis')

# Adding data labels
for i, category in enumerate(sorted_categories):
    count = category_counts[category]
    plt.text(count + 5, i, f'{count:}', va='center')

plt.title('Distribution of Influencers by Category')
plt.xlabel('Count')
plt.ylabel('Category')
plt.show()
```



```
# Define a mapping dictionary to merge similar categories
category_mapping = {
    'IT & ITES': 'Science & Technology',
    'Supernatural': 'Science & Technology',
    'Blogs and Travel': 'Vloging',
    'Reviews': 'Vloging',
    'Films':'Movie & Shows',
    'Real Estate':'Finance'
}

# Replace old categories with new ones using the mapping dictionary
data['Category'] = data['Category'].replace(category_mapping)

# Check the unique values in the 'Category' column after merging
print(data['Category'].unique())
print(data['Category'].nunique())
```

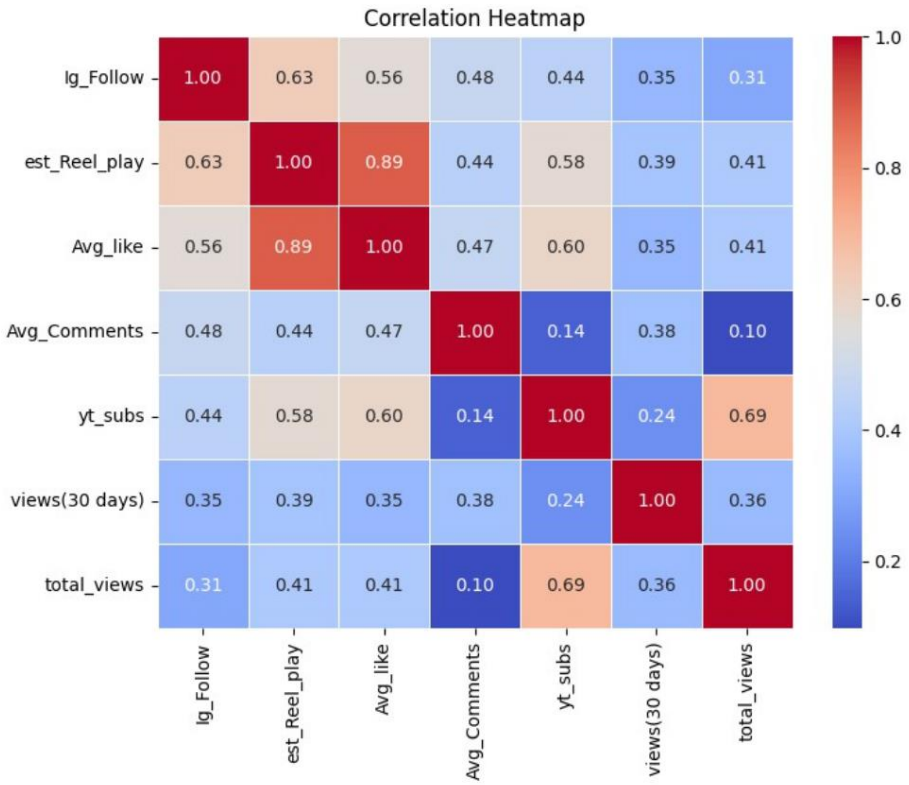
```
['Defence' 'Science & Technology' 'Vloging' 'Movie & Shows' 'Finance'
 'Health & Fitness' 'Gaming' 'Travel & Leisure' 'Sports' 'Education'
 'Autos & Vehicles' 'Fashion & Style' 'Beauty' 'Food & Drinks' 'Music'
 'Comedy' 'Entertainment']
17
```

After merging the specified categories, we have simplified the dataset by grouping similar themes together. Here are some insights based on the merged categories:

1. **Science & Technology:** The merging of *'IT & ITES'* and *'Supernatural'* into *'Science & Technology'* suggests a focus on technological and scientific content. This category likely encompasses topics related to information technology, IT-enabled services, and supernatural or futuristic subjects.
2. **Vlogging:** The merging of *'Blogs and Travel'* and *'Reviews'* into *'Vlogging'* indicates a shift towards content creation and user-generated reviews. This category may include blogs, travel-related content, and reviews of various products or services.
3. **Movie & Shows:** The merging of *'Films'* into *'Movie & Shows'* suggests a consolidation of content related to movies, television shows, and other visual entertainment media. This category likely covers a broad range of cinematic and episodic content.
4. **Finance:** The merging of *'Real Estate'* into *'Finance'* hints at a broader focus on financial topics. This category may include discussions about real estate investments, property markets, and other financial aspects related to real estate.

Overall, these mergers have streamlined the dataset and grouped similar categories together, making it easier to analyze and interpret. The insights derived from these merged categories can help in understanding the overarching themes present in the dataset and identifying trends or patterns related to these themes.

```
cat_cols=data.select_dtypes(include=['object']).columns
num_cols = data.select_dtypes(include=np.number).columns.tolist()
print("Categorical Variables:")
print(cat_cols)
```



Insights from Correlation Heatmap

Strong Positive Correlation:

1. *Est. Reel Play* and *Avg. Like*: 0.89
   - This correlation indicates a very strong positive relationship between the estimated reel play count and the average number of likes received. A coefficient of *0.89* suggests that as the estimated reel play count increases, the average number of likes also tends to increase significantly.

Moderate Positive Correlation:

1. *YT Subs* and *Total Views*: 0.69
   - This correlation demonstrates a moderate positive relationship between YouTube subscribers and total views. A coefficient of *0.69* indicates that as total number of views increases, the number of YouTube subscribers tends to increase moderately.
2. *IG Follow* and *Est. Reel Play*: 0.63

- This correlation signifies a moderate positive relationship between Instagram followers and estimated reel plays. A coefficient of *0.63* suggests that as the estimated reel play count increase, the number of Instagram followers also tends to grow moderately.

Positive Correlation:

1. *IG Follow* and *Avg. Comments*: 0.48
   - This signifies a positive relationship between Instagram followers and the average number of comments. With a coefficient of *0.48*, it suggests a tendency for an increase in Instagram followers to be associated with a slight increase in average comments.
2. *Avg. Comments* and *Avg. Like*: 0.47
   - This also indicates a positive relationship between the average number of comments and the average number of likes. A coefficient of *0.47* suggests a tendency for an increase in average comments to be associated with a slight increase in average likes.

Weak Positive Correlation:

1. *Views (30 days)* and *Total Views*: 0.36
   - This correlation suggests a weak positive relationship between views in the last 30 days and total views. A coefficient of *0.36* indicates a slight tendency for total views to increase as views in the last 30 days increase.
2. *YT Subs* and *Views (30 days)*: 0.24
   - This correlation indicates a weak positive relationship between YouTube subscribers and views in the last 30 days. A coefficient of *0.24* suggests a minor tendency for views in the last 30 days to increase as the number of YouTube subscribers increases.
3. *YT Subs* and *Avg. Comments*: 0.14
   - This correlation reveals a very weak positive relationship between YouTube subscribers and the average number of comments. A coefficient of *0.14* suggests a minimal tendency for the average number of comments to increase as the number of YouTube subscribers increases.

```
numerical_columns = ['Ig_Follow', 'est_Reel_play', 'Avg_like',
'Avg_Comments', 'yt_subs', 'views(30 days)', 'total_views', 'uplaods']
category_column = 'Category'

# Calculate the mean value for each numerical column grouped by
category
mean_values_by_category = data.groupby(category_column)
[numerical_columns].mean()

# Plot individual graphs for each numerical column
for numerical_column in numerical_columns:
    plt.figure(figsize=(10, 6))
    sns.barplot(x=mean_values_by_category.index,
y=mean_values_by_category[numerical_column])
```

PUBLICATIONS

Social Synergy: Empowering Connections, Amplifying Impact

Abstract:

In today's fast-paced digital marketing world, social media influencers are evolving alongside Artificial Intelligence (AI) and becoming key players in influencing consumer behavior and fostering brand engagement across the social platforms. But a new and intriguing trend has surfaced: the ascent of AI-generated virtual influencers (AIVI) which is concealing the boundaries between human and virtual interaction. Examples like Lil Miquela (United States), Imma (Japan), and Rozy (Korea) exemplify the global impact of these computer-generated personas in influencer marketing. This paper aims to explore the evolution process, creation process, impact, and ethical considerations surrounding AIVI in marketing campaigns. By synthesizing existing literature, the review aims to provide valuable insights into the implications of AIVI on digital media, marketing practices, and societal dynamics. Specifically, examining how AIVI have the potential to revolutionize marketing strategies which can offer highly personalized content and immersive brand experiences to customers. Yet, ethical concerns which are associated with the authenticity, transparency, and algorithmic bias of AIVIs must be addressed to ensure responsible integration into marketing practices. By delving into these ethical considerations, the review aims to contribute towards a broader understanding of the ethical implications of these AIVI in the digital marketing landscape. These AIVI present a promising future for brands to engage with consumers effectively in the ever-evolving digital landscape of marketing. However, the ongoing research and ethical scrutiny are essential for harnessing the full potential of these AIVI while mitigating the potential risks and concerns which are associated with them.

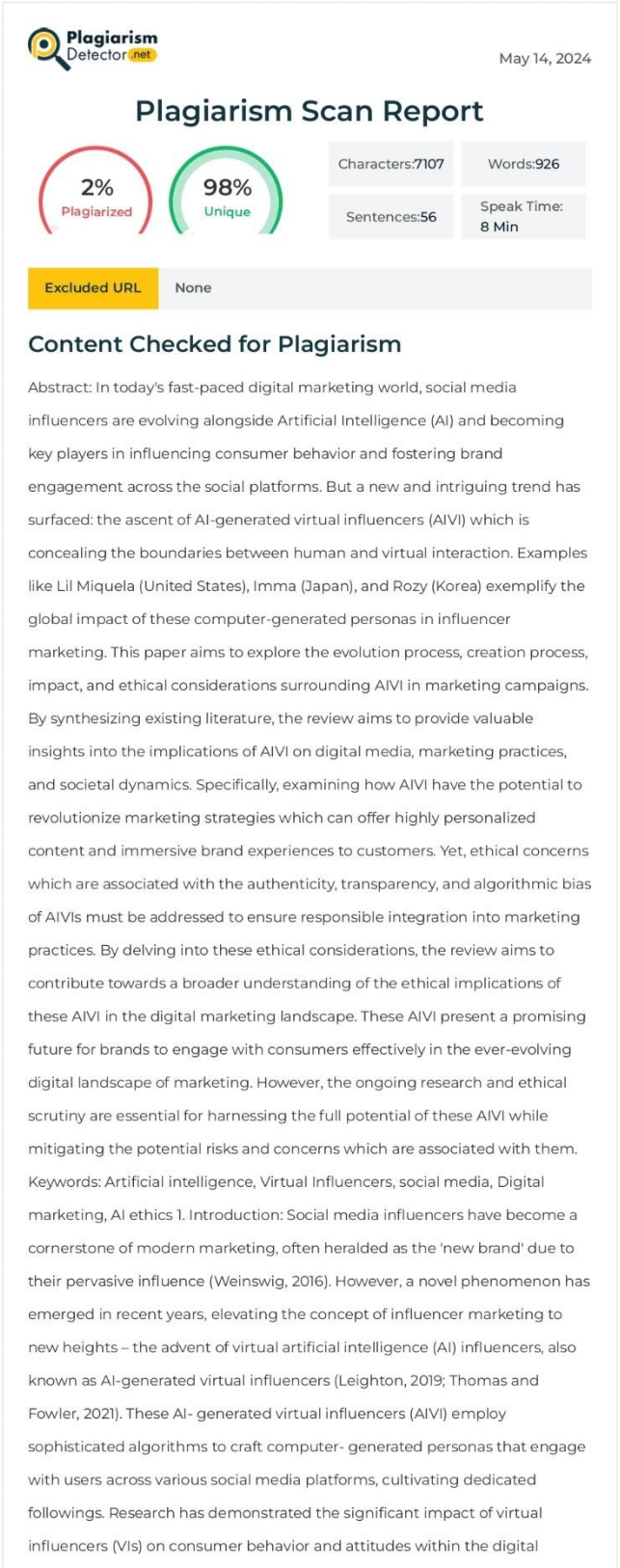
Keywords:
Artificial intelligence, Virtual Influencers, social media, Digital marketing, AI ethics

1. Introduction:

Social media influencers have become a cornerstone of modern marketing, often heralded as the 'new brand' due to their pervasive influence (Weinswig, 2016). However, a novel phenomenon has emerged in recent years, elevating the concept of influencer marketing to new heights – the advent of virtual artificial intelligence (AI) influencers, also known as AI-generated virtual influencers (Leighton, 2019; Thomas and Fowler, 2021). These AI-generated virtual influencers (AIVI) employ sophisticated algorithms to craft computer-generated personas that engage with users across various social media platforms, cultivating dedicated followings.

Research has demonstrated the significant impact of virtual influencers (VIs) on consumer behavior and attitudes within the digital landscape. Studies indicate that VIs are perceived as trustworthy, reliable, and relatable figures, fostering increased purchase intentions among consumers (M. Gerlich, 2023). Furthermore, VIs excel in promoting products and services by weaving captivating narratives and delivering visually striking content that resonates with audiences (D. Jiménez, 2019).

PLAGIARISM REPORT



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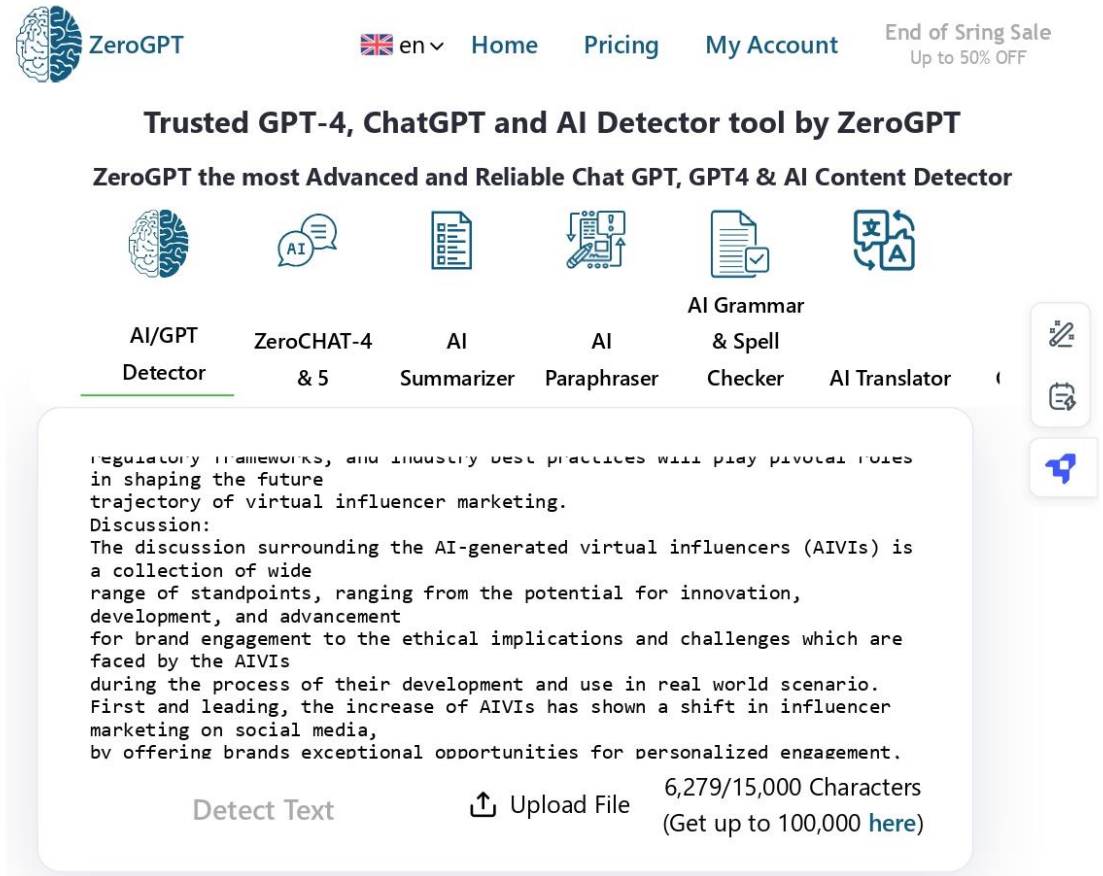
Abstract: In today's fast-paced digital marketing world, social media influencers are evolving alongside Artificial Intelligence (AI) and becoming key players in influencing consumer behavior and fostering brand engagement across the social platforms. But a new and intriguing trend has surfaced: the ascent of AI-generated virtual influencers (AIVI) which is concealing the boundaries between human and virtual interaction. Examples like Lil Miquela (United States), Imma (Japan), and Rozy (Korea) exemplify the global impact of these computer-generated personas in influencer marketing. This paper aims to explore the evolution process, creation process, impact, and ethical considerations surrounding AIVI in marketing campaigns. By synthesizing existing literature, the review aims to provide valuable insights into the implications of AIVI on digital media, marketing practices, and societal dynamics. Specifically, examining how AIVI have the potential to revolutionize marketing strategies which can offer highly personalized content and immersive brand experiences to customers. Yet, ethical concerns which are associated with the authenticity, transparency, and algorithmic bias of AIVIs must be addressed to ensure responsible integration into marketing practices. By delving into these ethical considerations, the review aims to contribute towards a broader understanding of the ethical implications of these AIVI in the digital marketing landscape. These AIVI present a promising future for brands to engage with consumers effectively in the ever-evolving digital landscape of marketing. However, the ongoing research and ethical scrutiny are essential for harnessing the full potential of these AIVI while mitigating the potential risks and concerns which are associated with them. Keywords: Artificial intelligence, Virtual Influencers, social media, Digital marketing, AI ethics 1. Introduction: Social media influencers have become a cornerstone of modern marketing, often heralded as the 'new brand' due to their pervasive influence (Weinswig, 2016). However, a novel phenomenon has emerged in recent years, elevating the concept of influencer marketing to new heights – the advent of virtual artificial intelligence (AI) influencers, also known as AI-generated virtual influencers (Leighton, 2019; Thomas and Fowler, 2021). These AI- generated virtual influencers (AIVI) employ sophisticated algorithms to craft computer- generated personas that engage with users across various social media platforms, cultivating dedicated followings. Research has demonstrated the significant impact of virtual influencers (VIs) on consumer behavior and attitudes within the digital

Page 1 of 3



Your Text is Human written

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AI GPT*

Conclusion:

In conclusion, the emergence and impact created by the AIVIs in the modern and dynamic digital environment has been proven to be more or less similar to human influencers in criteria of engagement and fan following in eyes of brands. the emergence of the AIVIs in marketing has helped in reducing the distance between the human, AI and virtual reality. By exploration of evaluation, creation, impact and ethical consideration one can make informed decision about whether to choose human influencer or virtual influencer for his marketing or influencing purpose.

CURRICULUM VITAE

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Education

Noida Institute of Engineering and Technology, *Uttar Pradesh* **2020 - 2024**
B.Tech in Computer Science and Engineering *(CGPA of 8.6)*
Lovely public Ser. Sec. School, *Delhi* **2019 - 2020**
Class 12th (PCM) *85%*

Work Experience

Bharat Intern – Data Science Intern *-Link* **July 2023 – Aug 2023**

- Leveraged **Kaggle** datasets to implement advanced LSTM-based stock price prediction models using Python in the **Jupyter Notebook** environment.
- Skillfully devised a sophisticated Titanic Classification system employing **Python**, analyzing critical variables such as socio-economic status, age, and gender to make accurate predictions regarding passenger survival.
- Demonstrated utmost proficiency and precision in executing the assigned tasks, ensuring seamless data analysis and model development throughout the project.

KPMG, Forage – Data Analyst Intern *-Link* **June 2023 – July 2023**

- Conducted thorough **data cleaning** and **transformation** using Excel, ensuring high-quality data for analysis.
- Developed an interactive **Power BI dashboard** to visually represent valuable sales insights for the company.
- Presented a comprehensive **presentation**, outlining data challenges, offering recommendations, and proposing data collection enhancements to enhance analysis accuracy.

DBT Mission, Government of India – *Web Developer* *-Link* **June 2022 – July 2022**

- Orchestrated **cross-functional collaboration** with the creative team, fostering a **synergistic environment** that led to the timely and successful completion of projects.
- Spearheaded application **design and development initiatives**, leveraging expertise in cutting-edge technologies to **create innovative** and **user centric solutions**.

Projects

Diwali Sales Analysis: Leveraging Data Insights to Enhance Performance and Profits *-Link* ***May 2023 - June 2023***

- Excel & Python for Exploratory Data Analysis: Meticulous data analysis, dynamic insights.
- Comprehensive sales & order analysis: Optimize operations and drive growth.
- Recommendations: Product Diversification, Data-Driven Adaptation, Cross functionality Collaboration.

IPL 2008-2023 Analysis: Data-driven Insights for Optimal Players Performance *-Link* ***Feb 2023 - May 2023***

- Demonstrated expertise in data manipulation and analysis through proficient execution of the **ETL process** using Pandas. Applied advanced calculations and selected **key performance indicators (KPIs)** for batting, bowling, and all-rounders, showcasing a strategic approach of teams.
- Excel and python for Exploratory Data Analysis to generate key insights from the data to get a better understanding of venue and players.

HR Attrition Insights: Empowering Retention Strategies with Actionable Analytics *-Link* **Oct 2022 - *Nov 2022***

- Created an interactive HR dashboard using Microsoft Power BI, leveraging a **Kaggle** dataset, to analyze attrition rates and identify factors influencing employee turnover.
- Generated an insightful **report with actionable suggestions** based on the dashboard analysis, enabling the HR team to implement targeted strategies for improving employee retention and satisfaction.

Technical Skills *-Link*

Language: Python, SQL, HTML, CSS
Technology: Machine Learning, Deep Learning, AI Prompt Writing, WordPress, Tailwind, Notion
Software: VS Code, Excel, Adobe Photoshop, Canva, Power BI, Tableau, Google Data Studio, Figma, Microsoft 365

Achievement

- **1st position** in the Data Digest competition at "**Ebullience-23**" (2023) technical fest held at **Noida Institute of Engineering and Technology, Uttar Pradesh.**
- **2nd position** in the Inter-School Team event on "**Atal Robo-War**" (2020) at **Lovely Public Senior Secondary School, Delhi.**
- Demonstrated a prototype of a **Mental Health Management Chatbot** in **"SEGUE"** (2023) technical fest held at **Noida Institute of Engineering and Technology, Uttar Pradesh.**
- Demonstrated a prototype of a **Sewage Cleaning Robot** in the International Exchange seminar on "**Promoting Public Awareness of IP, IP Education and Fostering Creativity Among Youth**" (2019) organized by the **Japan Patent Office (JPO)** supported by **Ministry of Commerce and Industry, Government of India.**
- Demonstrated a **Smart City Model** at "**CBSE Regional Science Exhibition"** (2019) held at **ASN Senior Secondary School, Delhi.**

Extra-Curricular Activity *-Link*

- Collaborated with the esteemed **REBOOT CLUB of NIET** to **facilitate seamless execution of diverse college events**, encompassing technical quizzes, development challenges, and competitive engagements.
- Orchestrated "**CLUTCH 2.0**" a prestigious esports tournament at **Noida Institute of Engineering and Technology, Greater Noida.**

Raj Gosain

Data Analyst

I'm a data-driven analyst, utilizing advanced tools and techniques to extract meaningful insights, drive informed decision-making, and deliver impactful results.

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EDUCATION

Study Program

Noida Institute of Engineering and Technology

08/2020 - Present — *Greater Noida, Uttar Pradesh*

Bachelor's degree in Technology

- Computer Science - AIML

SKILLS

Python | SQL | BI Tools | Machine Learning | Data Visualization | Web Development | Analytical | Data cleaning | Database Management

PERSONAL PROJECTS

Credit Card Fraud Detection: (08/2022 - 09/2022)

- - Developed a robust machine learning prediction model to identify fraudulent credit card transactions, ensuring consumer protection and preventing unauthorized charges.
- - Leveraged advanced machine learning techniques to accurately classify fraudulent transactions, contributing to the security and trust of credit card companies and consumers.

Diamond Price Prediction: (08/2022 - 09/2022)

- - Implemented and evaluated multiple regression models, achieving an outstanding R2 Score of 98.96% for the model with all features and 98.09% for the top 10 features.
- - Optimized the Random Forest Regression model's hyperparameters using grid search with cross-validation, striking a balance between model performance and runtime efficiency.
- - Utilized tools like VS Code, Google Colab, and Jupyter Notebook for seamless project execution, enabling efficient implementation and evaluation of machine learning algorithms.
- Skills Utilized: Python programming, Machine Learning, Problem-solving.

ACHIEVEMENTS

1st Position- Data Digest

1st place in the Data Digest competition during the annual technical fest "Ebullience-23" held at Noida Institute of Engineering and Technology, Greater Noida, Uttar Pradesh.

CERTIFICATES

Basic Data Descriptors, Statistical Distributions, and Application to business Decisions - Rice University

Introduction to NoSQL Database - IBM

Machine Learning Foundation: A Case Study - University of Washington

Building AI Powered Chatbots - IBM

WORK EXPERIENCE

Machine Learning Intern

YBI Foundation

08/2022 - 09/2022

Achievements/Tasks

- Developed a machine learning prediction model for Credit Card Fraud Detection, preventing unauthorized charges and ensuring consumer protection.
- Achieved an impressive R2 Score of 98.96% for Diamond Price Prediction, optimizing the Random Forest Regression model using grid search and considering performance trade-offs.
- Proficiently utilized tools like VS Code, Google Colab, and Jupyter Notebook for efficient implementation and evaluation of machine learning tasks.
- Demonstrated expertise in Python programming, Machine Learning, and problem-solving, delivering valuable insights and impactful solutions.

LANGUAGES

English — *Full Professional Proficiency*

Hindi — *Full Professional Proficiency*

INTERESTS

Interactive Design and User Experience Optimization.

Analytical Troubleshooting and Innovative Solutions.

Agile Skill Development and Cutting-Edge Technology Adoption.