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Data Science Analysis on UIN Raden Mas Said's Media Accounts

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Abstract: Social Media is an important part of human life in this era. Instagram is not only effective for communication but also effective for promotional activities. Ideally, every promotional content is created based on the target market. The Instagram account @uin.surakarta provides information about the Raden Mas Said Surakarta State Islamic University. Social media analysis with data science innovation allows institutions or account owners to easily identify audiences and understand their needs regarding the content displayed. This aims to enable social media account owners to create effective marketing strategies, present more targeted content products, and improve audience relationships. This study aims to analyze and provide data science innovations to support institutional promotional activities. The research method used is descriptive qualitative. The study results show that these accounts can be more useful with the right data approach

Keyword: account; analysis; social media

1. Introduction

In this digital era, social media is the easiest way to reach individuals. Platforms like Instagram, WhatsApp, Twitter (X), Facebook, and others have become integral parts of human life. According to data from NapoleonCat. Instagram users in Indonesia reached 90,183,200 as of August 2024, equivalent to 31.6% of the country's total population. This makes Instagram the most popular social media application after WhatsApp. The large number of users makes Instagram an effective platform for disseminating information to netizens. (Fitra Alfajri et al., 2019).

The official Instagram account @uin.surakarta, owned by Raden Mas Said State Islamic University Surakarta, plays a vital role as the university's primary social media channel for spreading academic information, interacting with students, and promoting various activities. The development of information technology has reshaped how students search for information. With the internet and social media applications, students have easier and faster access to various sources of information, whether related to academics or the latest campus activities (Sains & Indonesia, 2021).

Ideally, every promotional content created should be well-targeted. However, not every content uploaded or posted always receives a positive response from followers or the audience. Sometimes, social media marketers may have good content, but the chosen timing for posting may be less appropriate. This means that the content does not receive adequate attention from the online public or may not be suitable for the current situation

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and conditions. It is not only important to know what to post but also when and how to post it [3].

The use of social media analytics with data science innovation enables institutions or social media account owners to more easily identify their audience and understand their needs regarding displayed content. Consequently, social media account owners can create effective marketing strategies, build a positive image in the eyes of the public, present more targeted content products, and improve engagement with the audience to support the institution's promotional activities.

The previous research was conducted by Andres and Irving, who performed a sentiment analysis on Persija's official account. The study focuses on sentiment analysis of Instagram comments on Persija Jakarta's official account during the BRI Liga 1 2022/2023 season. The background emphasizes the role of social media in shaping public perception of football clubs. The research aims to classify audience sentiments, using comments related to match events like Starting Eleven, Halftime, and Fulltime. The method involves the Naïve Bayes Classifier, a machine learning technique that categorizes comments as positive or negative after preprocessing steps like cleaning, normalizing, and tokenizing the data. The analysis, applied to 3,000 comments, revealed frequently used terms such as "best," "spirit," and "Persija." Results show a higher number of negative sentiments (2960) compared to positive (1473), providing insights into audience reactions and informing social media strategies (Mondaref Jon & Vitra Paputungan, 2020) .

Another research by Rizka et al discussed about tiktok. The study examines public sentiment on TikTok content during the COVID-19 pandemic, focusing on a viral video by Queen Tasya Revina that criticized the government using the hashtag #tolakomnibuslaw. Using supervised machine learning algorithms, the researchers analyzed comments on the video, categorizing them as positive, negative, or neutral. Data was gathered from both TikTok comments and a Google Form survey. The analysis revealed that 85% of the comments were positive, 10% were neutral, and 5% were negative, indicating strong public support for the video and the hashtag. This highlights the significant role of hashtags in amplifying sentiment on social media (Namira Nur Az-Zahra et al., 2021).

Previous studies generally employed conventional data analysis approaches in evaluating the effectiveness of social media, such as basic statistical methods or manual analysis to measure audience response and content performance. While these methods provide fundamental insights, they are often less effective in handling large volumes of data and the complexity of interaction patterns on social media. This research differs by implementing data science innovations that integrate Python programming into the analysis. The use of Python enables automated data processing and the application of machine learning algorithms to analyze deeper trends and patterns, resulting in more accurate and efficient analysis. Consequently, this study can provide more targeted recommendations based on comprehensively analyzed data and facilitate the development of more measurable and data-driven marketing strategies. Therefore, this research intends to apply data science innovation to enhance analysis on social media.

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2. Method

The research employed a descriptive qualitative method with a descriptive analysis approach. Descriptive analysis is a commonly used approach in research to describe and summarize data characteristics without making inferences or generalizations about a larger population [6]. The aim of descriptive analysis research is to provide a clear picture of the phenomenon or subject being studied, while highlighting patterns, trends, and relationships within the data. The stages include: (1) coding, which involves using a coding system to identify themes or categories from qualitative data; (2) data visualization, where tables, charts, or narratives are used to present the data descriptively; and (3) summarization, where a summary is created to illustrate the characteristics, patterns, or relationships emerging from the data (Rijal Fadli, 2021).

2.1. Coding

The coding process was conducted using the Python programming language, which is known for its simplicity and ease of use. Python is a high-level, interpreted programming language known for its simplicity and readability, making it an excellent choice for both beginners and experienced programmers (Khusma & Oktaviarosa, 2023).Python offers a wide range of libraries and tools that allow developers to write code more efficiently and productively. With its clear and intuitive syntax, Python enables programmers to focus on problem-solving without getting bogged down by complex technical details. Additionally, Python provides strong support for various programming paradigms, such as object-oriented and functional programming, offering flexibility in application design. Libraries such as NumPy, Pandas, and Matplotlib make Python an ideal choice for data analysis and visualization, making it an invaluable tool across various disciplines, from data science to software development (Raschka et al., 2020).

2.2. Data Visualization

Data visualization is the process of presenting data in the form of charts, images, or other visual representations to facilitate the understanding, analysis, and communication of information. The goal of data visualization is to reveal patterns, trends, and relationships within the data that may not be immediately apparent when the data is presented solely in numerical or textual format. Effective visualization enables readers to quickly grasp complex information and make better decisions based on the data. Commonly used types of data visualization include bar charts, pie charts, histograms, scatter plots, and heatmaps. In this research, data visualization was carried out using the Python programming language, with the Matplotlib library (Costa & Aparicio, 2023).

2.3. Summarization

Summarization in descriptive analysis is commonly used in contexts like market research to understand consumer preferences and evaluate the performance of specific campaigns or initiatives

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3. Results

The analysis of the social media account uin.surakarta was conducted in three stages: coding, data visualization, and summarization, as explained below. The first step is coding.

3.1. Coding

The coding was performed using the Python programming language and the Visual Studio editor software. The software being used is the latest version of Visual Studio and Python. Below is a list of the source code for the development along with explanations of the code

The source code to imports the Instaloader library.

```
import instaloader
```

The source code to creates an Instaloader object.

```
L = instaloader.Instaloader()
```

The source code to specifies the name of the Instagram account to be scraped.

```
username = 'uin.surakarta'
```

The source code to determines the number of posts to be retrieved.

```
post_count = 30
try:
```

The source code to downloads the user profile.

```
profile = instaloader.Profile.from_username(L.context, username)
```

The source code to retrieves the number of followers.

```
    followers = profile.followers
    print(f"Jumlah Pengikut: {followers}")
```

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The source code to fetches the latest posts.

```
total_comments = 0

    for i, post in enumerate(profile.get_posts()):
        if i >= post_count:
            break
        total_likes += post.likes
        total_comments += post.comments
```

The source code to calculates the engagement rate.

```
engagement_rate = ((total_likes + total_comments) / (followers * post_count)) * 100
```

The source code to displays the results findings

```
    print(f"Total Likes dari {post_count} postingan terbaru: {total_likes}")
    print(f"Total Komentar dari {post_count} postingan terbaru: {total_comments}")
    print(f"Engagement Rate: {engagement_rate:.2f}%")

except instaloader.exceptions.ProfileNotExistsException:
    print("Akun tidak ditemukan.")
```

The results of implementing the program are shown in Figure 1 below;

Table 1. Output Coding

No	Category	Status
1	Follower	40.200
2	Real Follower	29.508
3	Fake Follower /Bot	10.692
4	Posts	1220
5	Engagement rate	1,74%
6	Average Likes	43
7	Average Comments	15

The next step in coding involves utilizing the Matplotlib library in the Python programming language. The objective is to enable automatic generation of data visualizations. Below is the program code to produce the data visualizations.

Data for total posts, likes, and comments

```
import matplotlib.pyplot as plt
```

The source code to import matplotlib

```
metrics = ['Total Posts', 'Total Likes', 'Total Comments']
values = [1220, 51800, 18300]  # Example data: 1220 posts, 51800 likes, and 18300 comments
```

Create a bar chart for the metrics

```
plt.figure(figsize=(10, 6))
plt.bar(metrics, values, color=['skyblue', 'lightgreen', 'salmon'])
```

Adding titles and labels

```
plt.title('Engagement Metrics for @uin.surakarta')
plt.xlabel('Metrics')
plt.ylabel('Count')
plt.grid(axis='y')
```

Display the plot

```
plt.show()
```

3.2. Data Visualization

The results of the program execution are illustrated in the following data visualizations:

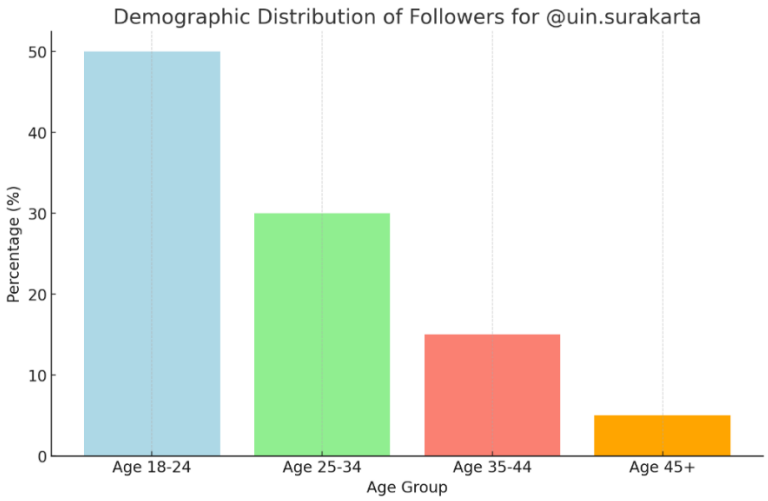

Figure 1. demographic distribution

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The bar chart in figure 1 above illustrates the demographic distribution of followers for the @uin.surakarta Instagram account based on age groups: Age 18-24: 50% ; Age 25-34: 30% ; Age 35-44: 15% ; Age 45+: 5% This visualization shows that the majority of the followers are in the younger age groups, particularly 18-24 years old, which aligns with the typical age range for university students and young professionals.

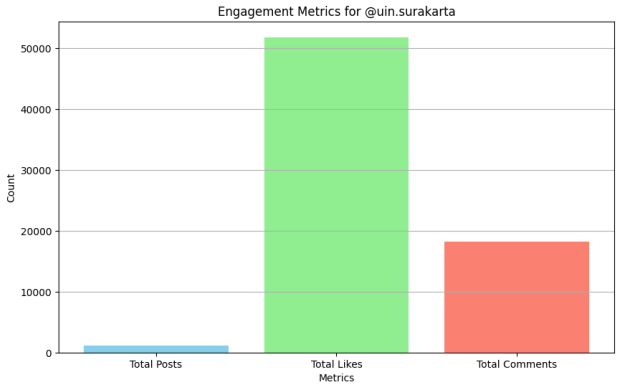

Figure 2. Engagement Metrics

Based on the figure 2 for the Instagram account @uin.surakarta, the following observations can be made: Total Posts (1200): The number of total posts is relatively low compared to the engagement metrics, suggesting that the account has a modest amount of content. Total Likes (51.800): The total number of likes is significantly higher than the number of posts and comments, indicating a high level of user interaction through likes. This could imply that the content resonates well with the audience, leading to a higher rate of likes per post. Total Comments (18.300) : While there are fewer comments compared to likes, the number is still substantial. This suggests that while users engage more with likes, there is also a good level of interaction through comments, which could indicate active audience participation and discussions

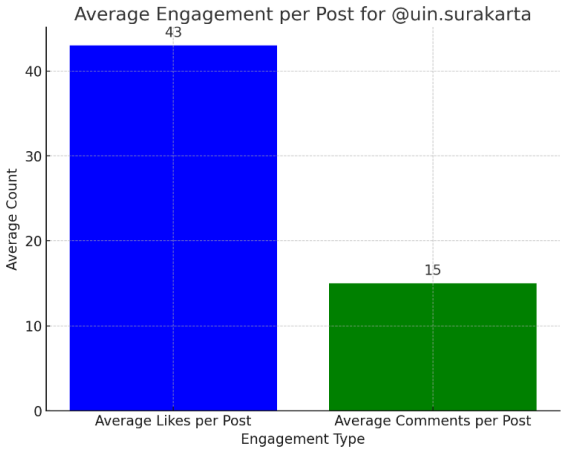

Figure 3. Average engagement

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Based on figure 3 above the following observations can be made. Average Likes per Post: The chart indicates that the average number of likes per post is 43. This is a relatively high number, suggesting that the content posted by @uin.surakarta resonates well with its audience. High likes can be an indicator of appealing content, effective use of visuals, or a strong connection with followers. Average Comments per Post: In contrast, the average number of comments per post is 15. This number is significantly lower compared to the likes. This disparity suggests that while followers are engaging with the content through likes, they are less likely to express their opinions or engage in discussions via comments

3.3. Summarization

Based on the demographic data of the followers and engagement metrics from the Instagram account @uin.surakarta, several conclusions can be drawn. First, examining the follower demographics reveals a significant dominance of young users. Specifically, 50% of followers fall within the age range of 18-24, while 30% are aged 25-34. Collectively, this means that 80% of the audience is under 34 years old, indicating that the account has a strong appeal among students and young adults. This presents an opportunity to develop content that aligns with the interests and needs of this age group. However, it is important to note that only 20% of the followers are aged 35 and above, suggesting that the account may struggle to attract older audiences. This limitation could restrict its reach and diversity of interactions. Turning to engagement metrics, the account has posted a total of 1,220 posts with about 100 posts already deleted, garnering 51,800 likes and 18,300 comments. On average, each post receives 43 likes and 15 comments. The high number of likes indicates that the content resonates well with the audience, reflecting a strong engagement level that may stem from relevant and appealing posts targeted at young followers. However, the relatively low average of comments suggests that while many users enjoy the content, deeper interactions are limited. This trend might imply that the audience prefers to express their approval through likes rather than engaging in further discussions. These insights lead to several implications for content strategy. First, the account should continue to focus on creating content relevant to younger age groups, potentially developing interactive formats such as quizzes, questions, or challenges that encourage active participation. Additionally, to increase comment engagement, the account could incorporate open-ended questions in captions and foster discussions among followers, creating a more vibrant community. Lastly, diversifying content to include topics that appeal to older demographics may help broaden the audience and increase the total follower count.

In summary, the @uin.surakarta account has a predominantly young follower base with high engagement levels in terms of likes but relatively low interaction through comments. By adjusting the content strategy to encourage greater engagement, the account has the potential to continue growing and reaching a larger audience.

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4. Discussion

Instagram accounts can be analyzed through various methods, one of which involves integrating programming techniques using Python. By utilizing libraries such as Instaloader, analysts can scrape data from Instagram, including metrics like follower demographics, engagement rates, and post performance. This data can then be processed and analyzed to identify trends and patterns in user behavior. Additionally, Python's powerful data visualization libraries, such as Matplotlib and instaloader, enable analysts to create compelling visual representations of the data, making it easier to interpret results and communicate findings effectively. Furthermore, machine learning algorithms can be applied to predict engagement rates or categorize content based on user interactions. By combining Python programming with traditional analytical methods, Instagram account managers can derive deeper insights, optimize content strategies, and ultimately enhance audience engagement.

5. Conclusion

In conclusion, the Instagram account @uin.surakarta has effectively fulfilled its promotional function, as evidenced by the analysis conducted using Python programming. The insights gleaned from user engagement metrics indicate a significant level of interaction, particularly among younger audiences. The high number of likes and consistent follower growth demonstrate that the account successfully captures the interest of its target demographic. Furthermore, the analysis highlights the relevance of the content shared, which resonates well with the audience, fostering a sense of community and engagement. Overall, the integration of programming techniques in the analysis has provided a comprehensive understanding of the account's performance, confirming its role as an effective promotional tool for the university. Python, with its robust capabilities in data science, offers a versatile approach for conducting analyses without relying on third-party software. Its rich ecosystem of libraries, such as instaloader for data manipulation and Matplotlib for data visualization, empowers analysts to handle vast datasets efficiently and effectively. This allows for greater control over the data analysis process, enabling users to tailor their methods to specific research questions or objectives. Furthermore, Python's readability and simplicity make it accessible for individuals with varying levels of programming expertise, facilitating collaboration among teams. By utilizing Python for data analysis, researchers and practitioners can streamline workflows, enhance reproducibility, and gain deeper insights into their data, ultimately leading to more informed decision-making and innovative solutions.

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