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Autogeneration social media content (TikTok, Instagram, Facebook, Twitter) based on artificial intelligence & robotic process automation

Jihan Luthfia Fauziah[1], Harul Fadiya Baiti Hanifah[1], Kris Sujatmoko[1]
[1]Department of Telecommunications Engineering, School of Electrical Engineering, Telkom University, Indonesia

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ABSTRACT

Robotic Process Automation (RPA) is an automation solution for creating content on social media. This RPA technology can imitate human behavior. This process is assisted by Artificial Intelligence (AI) to help produce video content using AI tools. Activities such as determining content topics, creating videos, saving videos, and uploading them are done automatically. So that the resulting content can be maximized in its publication, it is necessary to determine a topic that can help it. Social media has trending topics which, if turned into content, can influence increasing views, because the content can be more easily found by people who are interested in the content and motivate them to interact. Automatic content creation according to trending topics can be assisted through web scaping. Web scraping is a technique for getting information from websites automatically without having to copy it manually using Python. The implementation of web scraping is in the form of searching for topics that are trending on the Facebook platform.

Corresponding Author:

Jihan Luthfia Fauziah
Department of Telecommunication Engineering
School of Electrical Engineering, Telkom University
Bandung, Indonesia
Email: jihanlf21@gmail.com

1. INTRODUCTION

The rapid development of technology aims to facilitate human life. One technology that is developing rapidly is information technology such as the internet. The presence of the internet as an infrastructure and network has supported the effectiveness and efficiency of a company's operations, especially in the means to publish, communicate and obtain various information. One of the forms offered in the internet world is through social media.

The development of social media is marked by the emergence of social networking sites such as Twitter, Facebook, Instagram, Youtube and Tikok. Many people use social media as a means of communication, sharing daily activities, promoting goods or services and much more. This social media is utilized as a forum for virtual social activities by its users. The spread of news or content is triggered by social media algorithms from the results of activities carried out by social media users such as giving likes [1]. From among these social media users, both individuals and groups can communicate with each other. The use of social media is not only limited to communication, but users also use social media as a facility for promotion, doing business, developing creativity, developing expertise and much more. Some of them seek income from social media, such as becoming content creators.

Content creator is a job with a creative way of thinking. The content is created for digital media, such as Youtube, Instagram, Blogger, and other social media platforms [2]. Content creator is a profession that can be cultivated by everyone and various groups. Everyone can be creative in creating content. However, creating interesting content requires careful preparation regarding ideas and concepts. Success of the content also requires personnel and tools that can manage the content and consistency in uploading the content. So, the ease of creating content on social media is needed. One way to facilitate content creation is to use the capabilities of artificial intelligence (AI).

RPA is software that performs routine processing tasks based on simple rules. Its capabilities include entering data, making simple calculations, reading, and extracting data to responding to emails [2]. RPA is a general term for tools that operate on the user interface of other computer systems in a way that humans do. RPA aims to make it easier for humans by imitating human actions with the automation performed. Therefore, it is important to study and understand the implementation to be carried out regarding what will happen and the benefits in the implementation [3].

The integration of AI and RPA technology is an effort to increase the efficiency of content creation by finding out what trends are happening. This program is called Auto Generated Content (AGC). AGC can be defined as the process of creating content that is done automatically without human intervention. This can be done with the help of AI video creation tools from Woxo.tech that have a 9:16 aspect ratio and UiPath's RPA software that makes the automation process repeatable and makes human work easier. AGC can be used in various types of media such as text, images, and videos. AGC can also be used in blog creation.

In this program, AGC will create videos automatically and work by searching for trending information directly to be used as topics in content creation. The processing of topic information can be assisted through the web scraping process. Then the program can create content automatically from the information that has been obtained. Thus, the content can be uploaded on the desired social media using UiPath as a program flow maker. The social media used in this program are Tiktok, Instagram, Facebook, and Twitter. These social media will go through the same process in its automation. Then what needs to be done is monitoring the content that has been uploaded such as observing the number of likes, comments, and views and providing Social Media Optimization (SMO) techniques such as providing hashtags. So, this program aims to make it easier for humans to create repetitive content.

2. METHOD

This system design is divided into 3 sub systems, namely the web scraping process, autogenerated video content, and uploading to social media. This process will take place in UiPath Studio assisted by UiPath Assistant and compiled into a file with the extension ".exe." so that it can be executed or run on the Windows operating system. So, when the user wants to run the program, the user only needs to press run on the UiPath Assistant then all processes will be carried out automatically until the program is finished without using any more human assistance.

The system follows a step-by-step process to identify trending topics on social media. In this system, we achieve this by searching for trends through the Facebook API. This process is referred to as web scraping using RPA, which generates trending topics. Subsequently, from the identified trends, the topic ranked first is selected for content creation. The chosen topic is then processed to generate a descriptive text representing the topic. Next, the topic undergoes further processing to transform it into content using AI tools. The implementation of SMO strategies in video AGC can help improve the visibility, engagement, and results of the content. Once the content creation is complete, it is automatically uploaded to social media platforms using UiPath as the orchestrator of the upload process. A more detailed explanation of the system methodology is as follows:

- Web Scraping: The first step for this program to run involves web scraping. Web scraping aims to find specific information and then collect it. Web scraping aims to search for specific information and then collect it. Web scraping focuses on obtaining data through retrieval and extraction [5]. The web scraping method in the AGC system is performed automatically with the assistance of Python, eliminating the need for manual data processing. The social media object used for data extraction in web scraping utilizes the Facebook-scraper library and the Facebook API. The Facebook API is obtained by creating an account on Facebook Developer. The program also utilizes the pytrends.request library to access the Google Trends API and acquire popular search trends in Indonesia. In the context of the system, the use of an API Key is essential for retrieving comments from a particular post. Subsequently, the identified topics are connected to the Bing search engine or Copilot Microsoft Bing. Additionally, a cookie obtained from the Copilot Microsoft Bing platform using GPT-4 is necessary for authentication during interactions with the Bing search API.

- AGC Video: AGC in this system is developed using UiPath Studio to assist in the system's workflow, and Futurepedia.io as a tool to facilitate content creation more easily. The system operates automatically and on a scheduled basis utilizing features provided by UiPath, such as accessing and navigating web pages automatically. UiPath employs VB.Net as the programming language for RPA. The tool used on Futurepedia.io is woxo.tech. Woxo.tech is a leading solution for easy AI video content creation. Videos can be produced quickly, facilitating continuous engagement and keeping social media channels active. In WOXO there is a format for making videos according to the social media platform used. Then, WOXO can also provide options for making videos such as topic, background, language, music, text, and voice acting so that you can customize them. WOXO is hosted by Front10, LCC [6].
- Uploading to social media and using SMO Method: Content uploading to social media is automatically done using RPA, specifically UiPath Studio. By utilizing UiPath Studio, created and saved content will automatically be uploaded to social media accounts. The social media platforms used include TikTok, Instagram, Facebook, and Twitter. Besides automatic content uploading, UiPath Studio can schedule uploads using UiPath Assistant. It's necessary to add delays in this program to prevent errors due to videos not being uploaded yet.

In this implementation, the result is a video AGC system that can be tailored to current trending topics and automatically uploaded to social media accounts within a predetermined time frame. Additionally, this implementation also involves the use of tools and materials for creating content and automatically uploading content to social media as desired.

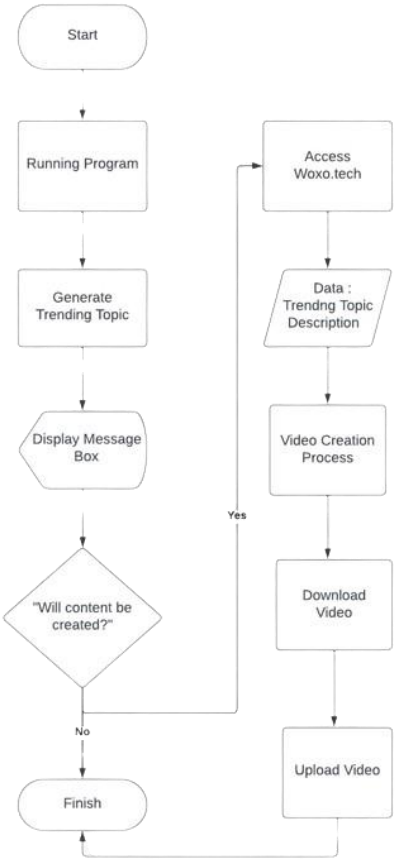


Figure 1. AGC System

Based on the AGC system flowchart in Figure 1. The initial step in the AGC system is to run the program by running the program. After the program starts execution, the program will generate trending topics or search and collect information on trending topics on social media. This process is called web scraping using python to generate trending topic keywords. Then the program will display a message box about the trending topic. The message box asks the question "Will you generate a video" with a choice of "Yes/No" options. If the user chooses the "Yes" option, the program will access the AI tools used, namely Woxo.tech. This tool is used to create video content based on the selected trending topic. The trending topic

keywords obtained from web scraping are processed into description text. The text is then processed into a video content. Furthermore, the content that has been created is downloaded and then put into a file on the device. The downloaded content is then uploaded to social media automatically using RPA then the program will stop. If the user chooses the "No" option, the program will stop immediately.

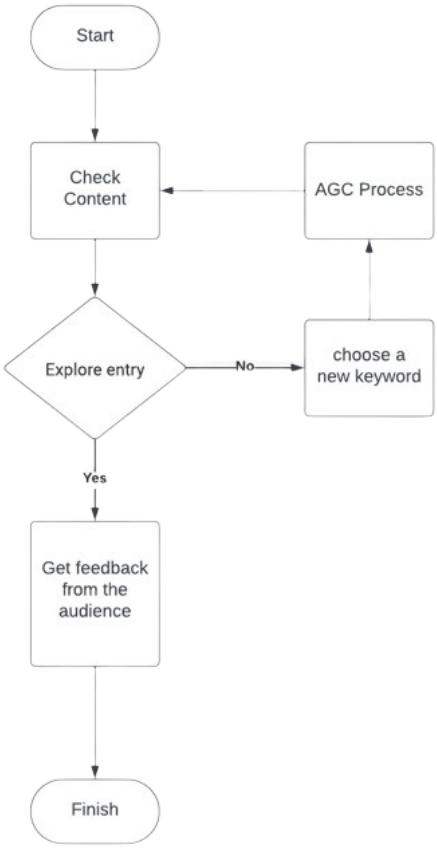


Figure 2. SMO Startegy

Based on the SMO strategy flowchart in Figure 2, it is explained that the process of implementing an SMO strategy begins with the observation and monitoring of content that has been uploaded to various social media platforms. At this stage, it is important to actively observe the responses and interactions received by the content from social media users. The expected result of SMO implementation is to get a positive response reflected in the form of increased likes, views, and comments. The SMO strategy used is to use popular hashtags or trending topics. Currently, hashtags are widely used by marketers as tools for marketing communication and promotion. Because the use of hashtags can increase engagement [7].

3. RESULTS AND DISCUSSION

In order to ensure the success of this AI & RPA-based Social Media Content Autogenerate program, the test scenarios need to be comprehensive and cover all the necessary and desired aspects of the program results. These tests are conducted to ensure that the program can efficiently perform video content generation, describe the program's ability to accurately replicate current trends, produce relevant and quality video content, and the program can create video content more quickly and easily understandable.

3.1. Operating procedure

This social media content autogeneration operation will involve several steps to create, manage, and execute it automatically. This operating procedure is divided into 2 stages but in the same ongoing process, namely the stage in generating AI videos with Woxo and the stage of uploading video results to Tiktok. Before the program is run, make sure the device is properly initialized.

As shown in Figure 3, this process will take place in UiPath Studio which is assisted by UiPath Assistant and compiled into an ".exe." extension file so that it can be executed or run on the Windows operating system. So that when the user wants to run the program, the user only needs to press run on the

UiPath Assistant then all processes will be run automatically until the program is complete without using human assistance again.

3.2. Web Scraping Test Results

Figure 3. Trending Results from Web Scraping

Web scraping is tasked with searching for trending topics on the Facebook platform. Subsequently, these topics are connected to the Bing or Copilot Microsoft Bing search engine. The obtained results consist of the top five trending topics. During the execution of the system, a message box will appear, providing notifications about the content that is currently trending today. This allows for a decision on whether to use the topic for content creation or not. If affirmative, the process will proceed to the video content creation stage. So that it can be proven that the results displayed in the message box are in line with the current trend on Google Trends As can be seen in Figure 3.

3.3. Comparison of Manual Posting with Auto Generated Program

Image Source: tiktok.com/explorerbot Image Source: tiktok.com/ariefgolang

Figure 4. Comparison of Manual Posting with Auto Generated Program

The next step involves evaluating the uploaded videos on the account. Full control is then given to the account by examining feedback such as the number of likes and comments. This operational procedure needs to be conducted regularly to obtain maximum feedback. The executed program simplifies the user's ability to create video content on social media that aligns with trending topics. In Figure 4 are comparison of video content results produced by a robot and a human. On the left side of the image is the result of a video obtained from the Autogenerate Content program, which garnered 43 likes. Meanwhile, on the right side of the image is content generated by a human with the TikTok account tiktok.com/ariefgolang, which received 15 likes. This indicates that content generated by both a robot and a human does not differ significantly in audience interest, as they contain the same information related to football, specifically the Salernitana vs Roma match. Therefore, using a robot as a tool for social media content automation can provide advantages due to the shorter time required to create content and the absence of human intervention in its creation.

3.4. Best Time to Post on Social Media

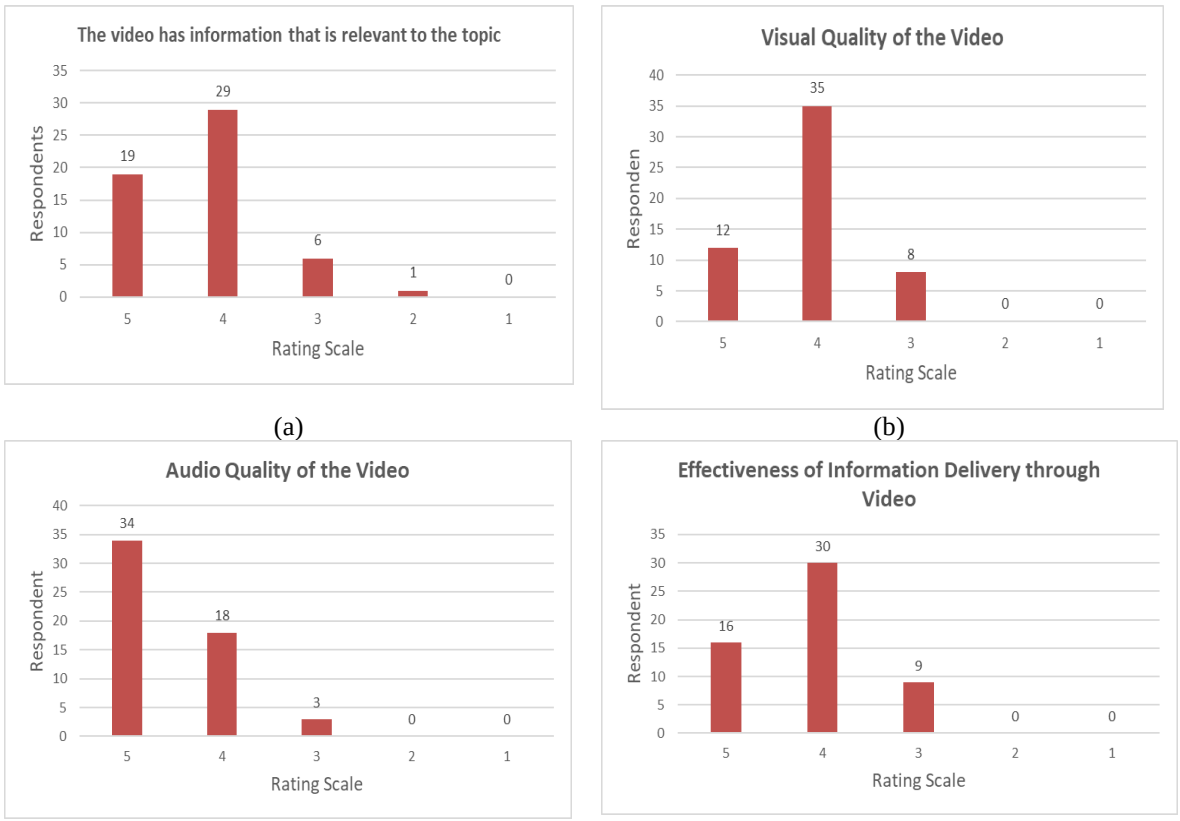
Figure 5. Social Media Global Engagement

Based on Sprout Social data in 2023 which is described in Figure 5, the best time to post content on the Tiktok platform is on Tuesday from 2 to 6 pm, Wednesday from 2 to 5 pm, Thursday from 3 to 5 pm. While Instagram, on Monday from 10 am to noon, Tuesday from 9 am to 1 pm, Wednesday from 10 am to 1 pm, and Friday from 9 to 11 am. Then Facebook, on Monday from 8am to 1pm, Tuesday from 8am to 2pm, Wednesday from 8am to 1pm, and also Thursday from 8am to noon. Lastly, Twitter is on Tuesday from 9am to 2pm, Wednesday from 9am to 1pm, Thursday from 9am to 2pm, and Friday from 9am to noon. However, all social media have their own algorithms that will affect changes in trends on social media, so the best time to post on social media also affects the algorithm. Algorithm is the process of turning input into output by analyzing user interests, interactions, user history and trending topics.

3.5. Video Content Testing Results

In the video content results analysis section, testing was carried out using a questionnaire with Google Form. A questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents to answer [8]. The Likert scale used in this test has a minimum score range of 1 to a maximum score of 5, with the aim of obtaining a clearer understanding of the tendency of responses from respondents [9]. The results obtained are in the form of respondent data. A total of 55 students filled out the questionnaire. Analysis of whether the video has information that is relevant to the topic, the visual

quality of the video, the audio quality of the video, and the effectiveness of delivering information through the video.



(a) (b)

(c) (d)

Figure 6. The Video Has Information That Relevan to The Topic (a), Visual Quality of The Video (b), Audio Quality of The Video (c). Effectiveness of Information Delivery trough Video (d)

The video has information according to the topic, obtaining the highest score in 4 of twenty-nine respondents, with fifty-two-point seven percent and can be understood that the program is already quite relevant to the topics discussed as shown in Figure 6. Then, the visual quality of the video got the highest score in the 4 of thirty-five respondents, with sixty-three-point five percent and can be understood video quality is already quite high. Letter, the audio quality received the highest score in 5 points of thirty-four respondents, with Sixty-one-point eight percent and can be interpreted as the audio quality of the content that has been made outstanding or excellent. And the effectiveness of the transmission of information through video, obtained the highest score in the 4 points of thirty respondents, with Fifty-four-point five percent and can be understood that the information provided has been sufficiently effective and well delivered.

3.6. Video Content Testing Results in Social Media

The development of social media is characterized by the emergence of social networking sites such as Twitter, Facebook, Instagram, Youtube and Tikok. Many people use social media as a means of communication, sharing daily activities, promoting goods or services and much more. This social media is utilized as a forum for virtual social activities by its users. The spread of news or content is triggered by social media algorithms from the results of activities carried out by social media users such as giving likes. [10]. After the testing process is carried out to determine the success of video content uploaded on social media, the results will be obtained in the form of the number of account interactions with the audience. The following is the maximum result obtained on Sunday, 8 February 2024.

Table 1. Result on Social Media

Platform	Followers	Most Number of Viewers	Most Number of Likes
Tiktok	613	1786	320
Instagram	232	423	202
Facebook	107	150	128
Twitter	118	593	27

Table 1 is the results obtained from this testing have positive impacts, such as content being deemed relevant to trending topics, the quality of the generated videos – both audio and visual – being considered good due to the AI tools adapting the audio and visual components. The ease of creating content using the program is also noted as easy and effective, as users only need to run UiPath Studio, and the program will execute according to the workflow. The success of content on social media is considered achieved, as the content is enjoyed by social media users and receives feedback in the form of likes.

3.7. Testing Analysis

Table 2. Result on Social Media

AGC Testing To-	Status
1-10	1st Testing Tiktok *Creator Center : Could Not Find The User-Interface*
	7th Testing *Click 'Select File': Could Not Find The User-Interface*
11-20	11th Testing *Pop Up Notification :* Tiktok
	16th Testing *Click 'Select From Computer' : Could Not Find The User-Interface*
	19th Testing *Click 'Path' : Multiple Similar Matches Found*
21-30	29th Testing *Type Into 'Edit' : Could Not Find The User-Interface*
31-40	Success
41-50	41st Testing *Click 'Svg' : Could Not Find The User-Interface*
	47th Testing *Click 'Div' : Multiple Similar Matches Found*
51-60	56th Testing *Main – Instagram.Xaml : Could Not Find The User-Interface*
61-70	62nd Testing *Click 'Post': Could Not Find The User-Interface*
	68th Testing Tiktok *Creator Center: Could Not Find The User-Interface*
71-80	77th Testing *Click 'Svg' : Could Not Find The User-Interface*
81-90	85th Testing *Pop Up Notification :* Tiktok
91-100	Success

From the overall testing of the robot workflow conducted using testing activities in UiPath, there were 13 test cases that failed to execute the program or had defects in the program. After conducting testing 100 times with 9 mistakes or errors, calculations can be done to determine the error percentage in the program using the formula:

$$Persentase\ Error = \frac{Number\ of\ Error}{Total\ Number\ of\ Test}\ x\ 100\%$$

$$= \frac{9}{100}\ x\ 100\%$$

$$= 9\%$$

Based on the percentage results obtained from 100 test runs, 9% of the programs experienced errors or failures, causing the program to not run smoothly. However, it can be said that the troubleshooting efforts have yielded positive results, as evidenced by the last ten test runs showing a significant absence of errors. Additionally, this outcome can also be observed from the running process of UiPath Assistant, where the program's running process can be completed without any hindering errors. Thus, despite the 9% error rate, the improvement and fixes made thereafter have positively impacted the quality and performance of the program. This is considered a successful testing phase, with results indicating significant progress in achieving quality and reliability levels in the program.

4. CONCLUSION

Based on the results of the Autogeneration Social Media Content system development, this system proves to be more efficient in aiding social media content creation. The process involves web scraping to gather trending topics, utilizing Artificial Intelligence (AI) tools for video creation, and employing Robotic Process Automation (RPA) software to upload content to social media platforms. Therefore, this program holds significant potential and benefits if further developed. The system is designed to operate automatically without human intervention but can follow a workflow similar to that of a human.

The resulting video content has a duration of less than 1 minute with an aspect ratio of 9:16. Subsequently, user accounts on TikTok, Instagram, Facebook, and Twitter are connected, facilitating content uploads on all these accounts. The Autogeneration Social Media Content system focuses on video content creation. Research indicates that video content, employing Social Media Optimization (SMO) strategies, outperforms static images due to its alignment with our desired system solutions. With video content, we can

trigger more active viewer interactions, easily disseminate content across various social media platforms, adjust quality as desired, and effectively convey information due to customizable expression, visualization, narration, and duration. This enhances aesthetic value and ensures content relevance to information.

From the results of the implemented program and testing that have been conducted, it is known that this program is categorized as successful because it has a success rate of 91% in executing the workflow with only 9% errors in the program. Then, the generated content received high ratings from respondents on Google Form. It is also revealed that the successful social media platform developed is TikTok ang Twitter, with a Social Media Optimization (SMO) strategy through the use of hashtags in the uploaded content.

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