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Application of Python for Analysis and Visualisation of ChatGPT User Dataset on College Students

Citra Andhini Rizkitha[1*], **Wahyu Supriyatin**[2], **Yasman Rianto**[3]

[1,2] Information Systems, Computer Science and Information Technology, Gunadarma University, West Java, 16424, Indonesia

[3] Computer Systems, Computer Science and Information Technology, Gunadarma University, West Java, 16424, Indonesia

Abstract

ChatGPT is an artificial intelligence supported by AI intelligence that allows textual conversational interaction. It is a versatile tool that can be used by various groups of people, including students. Students use ChatGPT to find information in support of their lecture activities. The increasing number of ChatGPT users among students has prompted research into analysis and visualisation of ChatGPT users in students. This study aims to conduct analysis and visualisation of ChatGPT users among students, both IT and non-IT students. The analysis is done to see whether ChatGPT can help and provide information to students. The results of the analysis will be displayed in the form of visualisation using bar charts so that the information conveyed is easy to see. The dataset used in the study was obtained from primary data through a questionnaire conducted to 80 respondents with 16 questions. In this research, qualitative analysis methods and data visualisation techniques were employed. The dataset obtained is then subjected to a process of cleaning to avoid data duplication and the inclusion of inappropriate data. Subsequent to the cleansing of the dataset, the data analysis process and data visualisation are then carried out. The analysis yielded several notable findings. Firstly, it was revealed that 85% of respondents were aware of ChatGPT, and furthermore, 75% of respondents expressed feeling assisted by its existence. However, 66% of respondents expressed reservations about immediate trust in the generated responses, and 60% indicated a lack of complete reliance on ChatGPT. Future research endeavours may explore the use of visualisation tools such as Looker Studio, Microsoft Power BI, or Tableau. Secondary data can be obtained from the Kaggle website, which contains a more varied range of data.

Keywords: *Analysis; Data; Python; Visualization*

1. Introduction

The advent of AI (Artificial Intelligence) has the potential to exert a profound influence on myriad facets of human existence [1]. Among the various AI systems that have gained widespread popularity is ChatGPT (Generative Pre-Trained Transformer) [2]. This particular AI system, a chatbot, employs advanced natural language processing capabilities to facilitate text-based conversational interaction. Its functionality encompasses language translation, the provision of recommendations, enhanced productivity, and contributions to the educational sector [3]. The emergence of ChatGPT has elicited diverse responses from the public, particularly within academic circles, thereby stimulating discourse on its utilisation. While some contend that ChatGPT poses a threat to academic integrity, others posit that it has the potential to streamline academic activities [4]. In the domain of education and academia, ChatGPT has become a widely popular tool among students, both in IT and non-IT disciplines. Students employ ChatGPT technology to support their learning process by finding information and references.

The initial step in any data analysis is to ascertain the next steps to be taken. Data analysis is described as the process of cleaning, analysing, interpreting and visualising data with various techniques, methods

*Corresponding author. *E-mail address:* citraandhini23@gmail.com
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and tools [5]. Data analysis constitutes a pivotal component within the broader domain of data processing. The utilisation of structured data processing methodologies has been demonstrated to facilitate the minimisation of errors and the identification of additional data requirements [6]. Two terms in data processing are data analytics and data analysis [5]. Data analysis can be presented in various ways, including graphs and tables [6]. The depiction of data analysis in various forms is known as data visualisation. Data visualisation can thus be defined as a graphical representation of data [7]. The utilisation of data visualisation aids in the analysis and comprehension of data [8] [9]. Data visualisation is defined as an analytical technique that employs data representation in visual form [10]. The utilisation of data visualisation fosters comprehension by situating data within a visual milieu. The purpose of data visualisation is to facilitate comprehension of the information to be conveyed [11].

Python is a programming language that is renowned for its simplicity in processing and presenting data, as well as its effectiveness in data analysis and visualization [12] [13]. The Python programming language places significant focus on the readability of code, thereby facilitating enhanced comprehension of syntax [14]. Additionally, Python is an interpretative programming language, which means that it focuses on code and syntax, facilitating ease of understanding. Moreover, Python offers a comprehensive suite of data visualisation tools, characterised by their accessibility and ease of use, encompassing a variety of interactive charts and graphs [6]. The Python Data Analytic Tool is utilised for data modelling and data cleansing. The construction of data analysis is based on data visualisation and data extraction [14]. The Python language is replete with libraries, including Matplotlib, Seaborn, Plotly, Folium, Pandas, and NumPy, amongst numerous others [8].

The aim of this research is to conduct an analysis and visualisation of ChatGPT users among students, with students majoring in IT and non-IT from various universities selected as the subjects of the study. The results of the analysis will be described in the form of data visualisation using bar charts. The analysis will examine the extent of ChatGPT awareness among students, the ability of ChatGPT to provide appropriate information, students' perceptions of the reliability of the information provided, and the efficacy of the solutions delivered by ChatGPT.The Python programming language will be utilized in conjunction with Google Colab for data analysis and visualisation. The Python libraries used for this research include Matplotlib, Pandas and NumPy.

Research conducted by Galahartlambang and associates [8] on data visualisation using the Python programming language on the COVD-19 dataset indicates that graphical reports are easily understood and facilitate rapid policy decisions by decision-makers. The Python programming language and supporting libraries can optimise big data problems in the context of government and business management. The libraries utilised in the research include Matplotlib, Seaborn, Plotly and Folium, and the research was conducted through the collection of datasets, their connection in dataframes, followed by data cleaning and evaluation before visualisation.

In a study by Hermanto et al. [15], Python was utilised for the analysis of the spread of the novel strain of the virus during the pandemic period. The findings of this research demonstrate the efficacy of Python in the visualisation of data, thereby presenting clear and detailed information in a user-friendly manner. Python is capable of data visualisation through a variety of means, including graphs, maps and diagrams. The utilisation of data visualisation facilitates the effective understanding of the distribution patterns, trends, and comparisons between regions of the virus, in addition to the impact of the handling policies implemented by the government. The Python libraries employed for data analysis include Pandas, NumPy, Matplotlib and Seaborn.The research utilised secondary data sourced from health institutions and trusted organisations, with visualisations taking the form of pie and bar charts.

Concurrently, Putri and colleagues [6] conducted data analysis and visualisation using the Python language, employing Google Colab (Google Colaboratory) for data processing in Python. The study utilised Google Colab to procure information regarding population data collection and to explore the necessary data.Prior to visualisation, analysis was conducted employing EDA (Exploratory Data Analysis) and CRISP-DM (Cross-Industry Standard Process for Data Mining) methodologies on the dataset.The findings of the analysis and visualisation demonstrate the potential to enhance the comprehension and knowledge of village employees in Sourcejo. Furthermore, it has been demonstrated that this approach can facilitate the process of data visualisation, leading to enhanced accuracy and efficiency.

Python was used by Lim and colleagues [16] to visualise the chances of surviving the Titanic accident, with the methods combining quantitative and qualitative approaches. The sample dataset was uploaded into Google Colab as a dataframe, and the libraries NumPy, Matplotlib, Pandas and Seaborn were utilised to support the data analysis and visualisation process. The findings indicated that the Python programming language was utilised to identify the chances of passengers who survived the Titanic accident. The analysis reveals that passengers with specific characteristics, including elders and children, were prioritised. Furthermore, adult passengers with special needs were also prioritised. Python succeeded in obtaining an

approximate probability of 0.38 for passengers who survived, with female passengers in class 1 and those with children prioritised.

Previous research on data analysis and visualisation using secondary data and Python libraries for visualisation include Matplotlib, Seaborn, Plotly, Folium, Pandas, NumPy and Seaborn. The current research utilises primary datasets obtained through the administration of questionnaires to 80 student respondents, employing Google Colab dataframe and Google Sheets for data management. The questionnaire encompasses 16 questions pertaining to ChatGPT, and the analysis method employed is qualitative, with the utilisation of bar charts for visualisation. The three libraries employed in this research are Matplotlib, Pandas and NumPy in Python, along with Google Colab dataframe and Google Sheets for processing the dataset.

The research programme was initiated with the collection of primary datasets using questionnaires administered to 80 respondents. Thereafter, the dataset was entered into Google Drive and Google Sheets for data cleaning. Once this process was complete, the dataset was then ready for analysis and visualisation using the Python programming language and Google Colab. The Python libraries that will be applied are Matplotlib, Pandas and Numpy. The dataset is in .csv format. Following analysis, the dataset is displayed in the form of visualisation using bar charts.

2. Methods

Data visualisation represents a form of graphical representation of data [8]. The use of visualisation serves to present the findings of data analysis, thereby making the information more accessible to users. The research method used is a data visualisation approach informed by a qualitative analysis method. The focus of this method centres on the description of the dataset utilised and the subsequent analysis of that dataset. The clean datasets that are ready to use will be imported into the Python programming language as a tool for conducting data analysis and visualisation. The research flowchart illustrating the analysis and visualisation of ChatGPT user distribution is depicted in Figure 1.

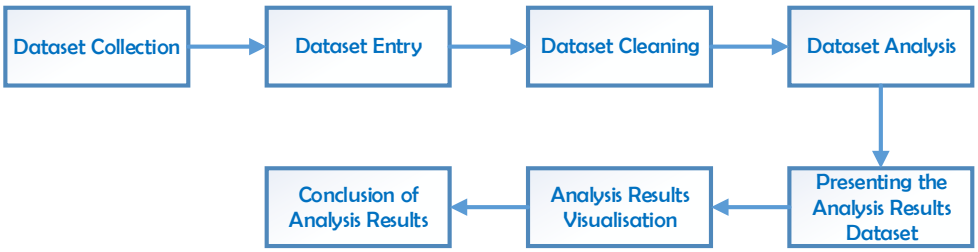

Figure 1. Research Flow

The explanation of each stage in the research flow used in Figure 1 is as follows:

a. Data Collection

This process refers to the collection of data that will be used as a dataset in the research. Datasets are collected through online questionnaires to students, both IT students and non-IT students. The questionnaire provided about the information provided by chatGPT, chatGPT users, the results of chatGPT, the experience of using chatGPT and the satisfaction of using chatGPT. The data is collated in the form of Excel files. The excel dataset will be converted from the .exlx format to the .csv format.

b. Data Entry

The dataset that has been collected thus will be input into the tools that will be used to analyse the data. Cleaning the data according to the needs to be visualised will be the next stage. The tools utilized for this task are Google Drive and Google Sheets.

c. Data Cleaning

Datasets obtained through online questionnaires are cleaned to select suitable ones for processing needs and remove unsuitable ones. The cleaned dataset remains in .csv format. It should be noted that data cleaning may result in a decrease in the amount of data collected.

d. Data Analysis

Data that has been cleaned and ready for further processing can then be analysed. The data will be processed according to the analysis's requirements, including the number of students who understand chatGPT, the subjects that used chatGPT the most, and its ability to solve existing solutions.

e. Data Visualisation

The data from the analysis is then visualised to make it easier to see and describe. Visualisation is made in the form of graphs that are easy to understand. This is done using the Python programming language and Google Colab for visualisation graphics. The dataset entered into Python is a clean .csv format. The Python

libraries used are Matplotlib, Pandas and Numpy.

f. Conclusion of Results

The final phase of the research is where the results of data visualisation will be presented in the form of graphs. These will relate to the number of students who understand chatGPT, and its ability to solve existing solutions.

3. Result and Discussion

The implementation of data analysis and data visualisation was carried out on a ChatGPT user dataset among students majoring in IT and non-IT disciplines. The Python programming language was used for data analysis and visualisation. The results of the data analysis were displayed using bar charts to the deliver the information. The research using a dataset from 80 respondents. The data was collected using online questionnaires administered via Google Forms. The following steps were taken during the data analysis and data visualisation stages:

a. Collection of the Research Dataset

The initial stage involves preparing the dataset for data analysis and visualisation. Datasets are obtained by creating online questionnaires and distributing them using Google Forms. The questionnaire was given to 80 respondents, who will be used as datasets in the study. The questionnaire contain 16 questions, and the dataset is in the form of primary data obtained directly from respondents' answers.The dataset was transferred using Google Sheets in tables and made in CSV format.The questions given to respondents concerned the information provided by chatGPT, chatGPT users, the results of chatGPT, the experience of using chatGPT and the satisfaction of using chatGPT.

b. Stages of Data Cleaning

The dataset obtained from the questionnaire process is then subjected to the data cleaning stage. This process involves the removal of missing values, the identification of unnatural outliers, the handling of duplicate data, and the correction of incorrect and inconsistent data formats. In addition to the data cleaning stage, inappropriate data types are also changed, appropriate attributes are selected for use in visualisation and irrelevant attributes are removed. The objective of this process is to ensure that the dataset is suitably prepared and ready to undergo visualisation.

Figure 2 presents a segment of data derived from an online questionnaire administered via Google Forms, encompassing responses from 80 respondents, presented in tabular format. Figure 3 presents a segment of data from a processed questionnaire in CSV format. The results of the questionnaire in Figure 3 are presented in the form of numbering 1 to 5. The numerical values assigned to each response are as follows: 1 = strongly disagree, 2 = disagree, 3 = moderately agree, 4 = agree, and 5 = strongly agree.

Timestamp	Email Address	Nama Lengkap	Prodi Jurusan
25/06/2023 8:14:12	raidhakusuma@gmail.com	Raidha Hasna Kusuma	Administrasi Rumah Sakit
25/06/2023 13:46:30	diaz.youstiza0202@gmail.con	Diaz Alfazaa Qautsar Youstiza	Manajemen transportasi udara
25/06/2023 13:52:22	ginarisnatasya@gmail.com	Natasya W. G.	Ilmu Komunikasi
25/06/2023 13:53:16	maulidaarh27@gmail.com	MAULIDA AULIA RAHMA	ILMU KOMUNIKASI
25/06/2023 14:03:56	meliyaagustina88@gmail.com	meliyaagustina	manajemen dakwah
25/06/2023 15:08:18	arfanarifin92@gmail.com	muhammad arfan arifin	Broadcasting
25/06/2023 15:55:38	hayagazalah@gmail.com	Haya Gazalah	Teknik Perawatan Pesawat Ud
25/06/2023 19:36:02	alyanurullita96@gmail.com	Alya Nurul Lita	PGSD
26/06/2023 0:08:34	bilaheren@gmail.com	Nabila Hairani	Ilmu Komunikasi
26/06/2023 0:14:29	frhtnnabilas@gmail.com	Farhatun nabila setiadi	Ilmu komunikasi
26/06/2023 16:42:00	yaumielsyakira@gmail.com	yaumi el syakira	Ilmu komunikasi
26/06/2023 20:07:11	musalamkeder@gmail.com	Chaidir musalam r	MANAJEMEN
27/06/2023 22:12:02	alifahasnaputri@gmail.com	alifa hasna putri	Manajemen Transportasi Laut
07/07/2023 13:25:59	zahraaprina@gmail.com	aprinazzahra putri maharani	sosiologi
07/07/2023 13:32:20	adityasmtpng12@gmail.com	Aditya simatupang	Public Relation
07/07/2023 13:32:51	firafanti@gmail.com	Fakhira Puteri Fanti	Manajemen
07/07/2023 13:39:02	gazaliridwan2@gmail.com	Ridwan Gazali	Teknologi Rekayasa Konstruks
07/07/2023 15:01:50	nadineramadhania@gmail.com	Nadine Ramadhania	Ilkom
07/07/2023 16:09:47	shanazsazkia@gmail.com	shanaz sazkia	akuntansi
07/07/2023 23:03:58	ptrangraina@gmail.com	Putri anggraina	Hukum
08/07/2023 1:29:16	anggirosalina08@gmail.com	Anggi Rosalina Simatupang	Bahasa Inggris
08/07/2023 12:42:50	Ghifariian@gmail.com	Muhammad Hafiz	Manajemen
08/07/2023 14:43:59	lauranggela@gmail.com	Laura anggela	Administrasi bisnis
08/07/2023 16:42:23	handikapangestu1@gmail.com	Handika pangestu	Management

Figure 2. Respondent Questionnaire Results

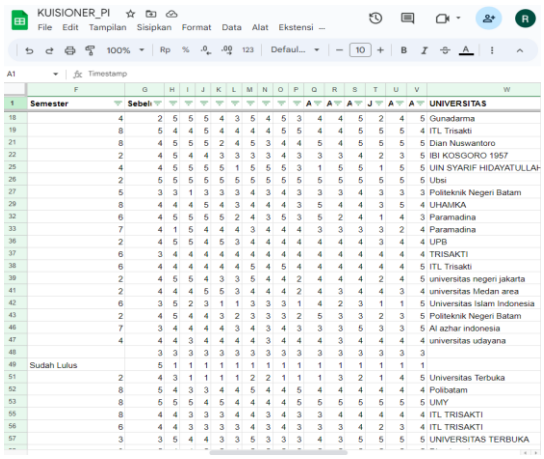

Figure 3. Questionnaire Processing Results

c. Data Analysis

The subsequent stage is the analysis of the dataset, which is preceded by the cleaning of the dataset. Analysis is then conducted to classify data as required. In this study, the dataset is divided into two classifications: IT students and non-IT students. Table 1 provides a breakdown of the IT student respondents, while Table 2 presents the non-IT student respondents.

Table 1. IT Student Respondent Dataset

Name	P1	P2	P3	P4	P5	P6	...	P12	P13	P14	P15	P16
IT	5	5	5	5	5	5	...	4	5	3	5	4
IT	5	5	5	5	5	5	...	5	5	5	5	5
IT	4	5	3	4	3	5	...	3	3	2	4	4
IT	5	5	4	4	4	4	...	3	4	3	4	5
IT	5	5	4	4	4	4	...	3	4	3	4	5
IT	4	5	5	5	4	3	...	3	4	3	4	5
IT	1	1	1	1	1	1	...	1	1	1	1	3
IT	5	5	5	5	5	5	...	4	5	3	5	5
IT	3	5	4	3	4	4	...	3	3	2	4	5
IT	4	5	5	5	4	2	...	3	5	3	5	5
...	...	...	...	...	...	...	...	...	...	...	...	...
IT	4	4	3	5	4	3	...	3	4	4	4	5
IT	5	5	2	3	3	3	...	3	3	2	3	4
IT	5	3	3	3	5	5	...	3	3	1	3	5
IT	4	5	3	4	2	3	...	2	3	3	3	4
IT	4	5	4	4	4	4	...	1	3	2	3	5
...	...	...	...	...	...	...	...	...	...	...	...	...

Table 2. Non-IT Student Respondent Dataset

Name	P1	P2	P3	P4	P5	P6	...	P12	P13	P14	P15	P16
Non_IT	2	5	5	5	4	3	...	4	5	2	4	5
Non_IT	5	4	4	5	4	4	...	4	5	5	5	4
Non_IT	4	5	5	5	2	4	...	4	5	5	5	5
Non_IT	4	5	4	4	3	3	...	3	4	2	3	5
Non_IT	4	5	5	5	5	1	...	5	5	1	5	5

Non_IT	5	5	5	5	5	5	...	5	5	5	5	5
Non_IT	3	3	1	3	3	3	...	3	4	3	3	3
Non_IT	4	4	4	5	4	3	...	4	4	3	5	4
Non_IT	4	5	5	5	5	2	...	2	4	1	4	3
Non_IT	4	1	5	4	4	4	...	3	3	3	2	4
...	...	...	...	...	...	...	...	...	...	...	...	...
Non_IT	3	3	3	3	3	3	...	3	3	3	3	3
Non_IT	5	1	1	1	1	1	...	1	1	1	1	1
Non_IT	4	3	1	1	1	1	...	3	2	1	4	5
Non_IT	5	4	3	3	4	4	...	4	4	4	4	4
Non_IT	5	5	5	4	5	4	...	5	5	5	5	5
...	...	...	...	...	...	...	...	...	...	...	...	...

Moreover, the datasets from Tables 1 and 2 were merged using a formula in Spreadsheet to ascertain the number of respondents who answered 1 (strongly disagree), 2 (disagree), 3 (disagree), 4 (fairly agree) and 5 (strongly agree). Table 3 is a cut table combining IT and non-IT respondents.

Table 3. Merging IT and Non-IT Student Respondent Datasets

Value	IT1	Non IT1	IT2	Non IT2	IT3	Non IT3	...	IT7	Non IT7	IT8	Non IT8	...
1	2	0	2	2	1	3	...	1	1	1	1	...
2	0	1	0	0	2	2	...	2	1	3	1	...
3	3	6	1	4	7	5	...	5	6	11	13	...
4	12	15	5	11	11	10	...	12	12	11	11	...
5	12	7	21	12	8	9	...	9	9	3	3	...

The Python library utilised for importing data are Pandas, Matplotlib and Numpy. The Pandas library facilitates the manipulation and analysis of data in tabular form (i.e. a dataframe). The Numpy library is employed for mathematical operations and numerical array manipulation, while the Matplotlib library is used for the creation of data visualisations, including line plots, bar plots, scatter plots and other plots.

Initially, a connection will be set up to the dataset, allowing the user to import data from Google Drive and use the relevant library to pre-process the data. After the file has been read, it will be converted into a dataframe object via the 'read_csv()' function on Figure 4. This will be followed by the execution of other commands that will display and view the contents of the dataframe, as well as the dataframe information and other information needed for the data visualisation stage.

Figure 4. Python Import Code and Libraries

d. Data Visualisation Stages

Subsequent to the analysis of the dataset, the visualisation process is then initiated with the data in Table 3. The visualisation will be displayed in the form of a bar chart so that the information is easily understood by users. Figure 5 is a form of visualisation related to the number of respondents who are familiar with ChatGPT. Figure 5 reveals that 35 IT students demonstrated a higher level of knowledge regarding ChatGPT in comparison to non-IT students, as evidenced by the proportion of respondents selecting options 5 (strongly agree) and 4 (quite agree).

The Figure 6, show the level of satisfaction using ChatGPT from both IT student and non-IT student.

The bar chart illustrates the level of satisfaction among IT students and non-IT students concerning the utilisation of ChatGPT, as indicated by the selection of number 4 (moderately agree).

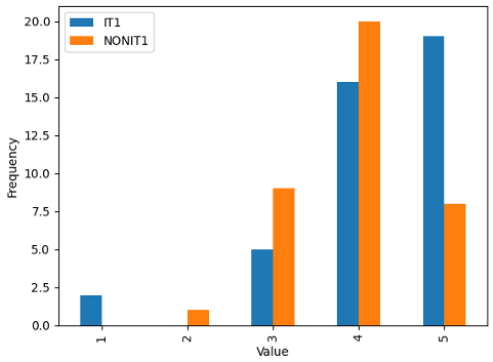

Figure 5. Bar Chart That Knows ChatGPT

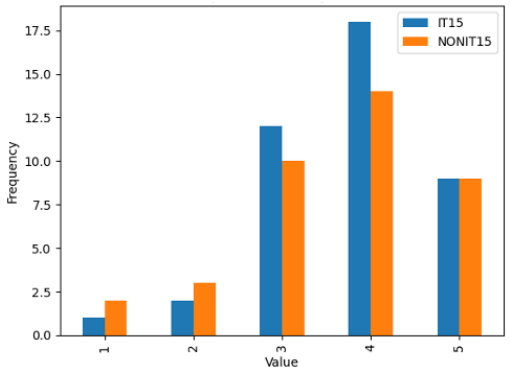

Figure 6. ChatGPT User Satisfaction Bar Chart

Figure 7 is a bar chart related to the information provided and obtained through ChatGPT. The bar chart reveals that both IT students and non-IT students feel quite helped regarding the search for information carried out using ChatGPT. The bar chart reveals that non-IT students feel significantly aided by ChatGPT in locating the necessary information. This is further evidenced by the respondents' selection of option 4, which indicates a high degree of agreement.

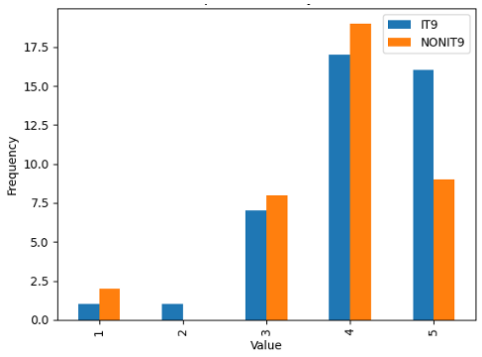

Figure 7. Bar Chart of Information Provided by ChatGPT

e. Stages of Interpretation of Results

Table 4 presents the percentage results of 80 respondents from the visualisation carried out on 16 questionnaire questions. The percentage results were obtained from 42 respondents in the IT and 38 respondents from Non IT.

As demonstrated in Table 4, a significant proportion of respondents expressed agreement with question 2, which pertained to their familiarity with ChatGPT. Conversely, in question number 16, 85% of respondents concurred that ChatGPT is undergoing continuous development and iteration. However, a contrasting response was observed in question 12, where 66% of respondents expressed reservations about immediate trust in the responses generated by ChatGPT. Furthermore, in question 10, 60% of respondents indicated their intention to refrain from relying on ChatGPT.

Table 4. Respondent Dataset Visualization Results

Question Number	Number of Respondents	Percentage
1	63 agree	79% agree
	17 disagree	21% disagree
2	68 agree	85% agree
	12 disagree	15% disagree
3	53 agree	66% agree
	27 disagree	34% disagree
4	60 agree	75% agree
	20 disagree	25% disagree
5	47 agree	59% agree
	33 disagree	41% disagree
6	39 agree	49% agree
	41 disagree	51% disagree
7	59 agree	74% agree
	21 disagree	26% disagree
8	40 agree	50% agree
	40 disagree	50% disagree
9	61 agree	76% agree
	19 disagree	24% disagree
10	32 agree	40% agree
	48 disagree	60% disagree
11	56 agree	70% agree
	24 disagree	30% disagree
12	27 agree	34% agree
	53 disagree	66% disagree
13	57 agree	71% agree
	23 disagree	29% disagree
14	25 agree	31% agree
	55 disagree	69% disagree
15	50 agree	62% agree
	30 disagree	38% disagree
16	68 agree	85% agree
	12 disagree	15% disagree

4. Conclusion

From the analysis and visualisation of the data on ChatGPT users among students using the Python programming language, it can be concluded that both IT and non-IT students all know and understand how to use ChatGPT, as can be seen from question number 2, which is answered with a percentage of 85%. The analysis of question number 4 shows that 75% of the respondents feel helped by ChatGPT. 85% of respondents agree with question number 16 which states that ChatGPT is updated. The facility in the Python programming language used for the data visualisation process is the Matplotlib library. This library is used to display the results of data analysis in the form of bar graphs. For further research, data analysis can be performed using the Online Analytical Processing (OLAP) method using BigQuery, while data visualisation can be performed using Looker Studio or Microsoft Power BI or Tableau. The dataset used for further research can make use of secondary data, which is more numerous and varied using the Kaggle website. Contains an acknowledgment of thanks to an agency if this research was funded or supportedby that agency, or if there were parties who significantly assisted directly in the research or writingof this article. If the party is already listed as the author, then there is no need to mention it againin this Acknowledgment

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