SOCIETY: Jurnal Pengabdian Masyarakat,
Vol. 4, No. 3 (2025): May, pp. 375-384
E-ISSN:2827-878X (Online -Elektronik)

Python and Data Science: Building a Foundation with Practical Projects

Yasir Abduzzhohir [1,*], Muhammad Raihan Saleh [2], Sunatun [3], Agita Irvanda Saputra [4], Ramzy Al Firza Wahyudi [5], Hendra Hendra [6], Rully Mujiastuti [7], Mirza Sutrisno [8], Jumail[9], Nurvelly Rosanti [10]

[1,2,3,4,5,6,7,8,9,10] Program Studi Teknik Informatika, Fakultas Teknik, Universitas Muhammadiyah Jakarta

yasirabduzzhohir@gmail.com

ARTICLE INFO

Article history

Received : 13-2-2025

Revised : 28-4-2025

Accepted : 6-5-2025

Keywords

Data Science; Python; Webinar; Workshop

ABSTRACT

In today's digital era, data has a crucial role in decision making. To increase public understanding, especially students, about Data Science, a webinar and online workshop titled "Python and Data Science: Building a Foundation with Practical Projects" was conducted through the Zoom Meeting Conference platform. This activity aims to provide a basic understanding of the concepts, benefits, and applications of Data Science in various industrial fields. Participants are invited to learn the use of Python in data analysis, and are given case study projects related to sales data analysis to apply the knowledge they have gained. This webinar and workshop activity was held on January 23, 2025, at 09.00 WIB which was attended by 40 participants from various institutions. The evaluation results show that participants expressed their satisfaction as indicated by the percentage of positive values in the feedback of 40% satisfied and 37% very satisfied with this activity. In addition, there was an increase in participants' understanding of Data Science, with the Pre-Test average score increasing from 7.87% to 8.21% on the Post-Test.

Di era digital saat ini, data memiliki peran krusial dalam pengambilan keputusan. Untuk meningkatkan pemahaman masyarakat, khususnya mahasiswa, mengenai Data *Science*, telah dilaksanakan *webinar* dan *workshop* daring bertajuk "*Python and Data Science: Building a Foundation with Practical Projects*" melalui platform *Zoom Meeting Conference*. Kegiatan ini bertujuan memberikan pemahaman dasar tentang konsep, manfaat, dan penerapan Data *Science* dalam berbagai bidang industri. Peserta diajak untuk mempelajari penggunaan *Python* dalam analisis data, serta diberikan proyek studi kasus terkait analisis data penjualan untuk mengaplikasikan pengetahuan yang telah diperoleh. Kegiatan *webinar* dan *workshop* ini dilaksanakan pada tanggal 23 Januari 2025, pukul 09.00 WIB yang diikuti oleh 40 peserta dari berbagai institusi. Hasil evaluasi menunjukkan bahwa peserta menyatakan kepuasan mereka dengan ditunjukkan besaran persentase nilai positif pada *feedback* sebesar 40% puas dan 37% sangat puas dengan kegiatan ini. Selain itu terdapat peningkatan pemahaman

SOCIETY: Jurnal Pengabdian Masyarakat,
Vol. 4, No. 3 (2025): May, pp. 375-384
E-ISSN:2827-878X (Online -Elektronik)

peserta terkait Data *Science*, dengan nilai rata-rata *Pre-Test* meningkat dari 7,87% menjadi 8,21% pada *Post-Test*.

A. INTRODUCTION

The Magang dan Studi Independen Bersertifikat (MSIB) Program, initiated by the Ministry of Education, Culture, Research, and Technology (Kemdikbudristek), is a strategic step toward enhancing the quality of human resources in Indonesia. Through this program, students have a golden opportunity to develop their skills and knowledge within the industrial sector while also earning academic recognition through credit conversion(Rahman et al., 2023). Partnerships with leading companies offer valuable hands-on work experience and monthly living allowances, enabling students to focus on their personal and professional development.

In today's digital era, marked by rapid technological advancements, expertise in the field of Data Science has become increasingly crucial (Syamsu & Widodo, 2021). The growing demand for accurate and in-depth data analysis to support informed decision-making has driven the need for skilled Data Science professionals. Unfortunately, a gap still exists between industry demands and the availability of competent Data Science talent (Suranti et al., 2022). This mismatch presents challenges for companies in managing and utilizing their data effectively, leading to suboptimal decision-making and hindering the potential growth of Indonesia's digital economy.

To address these challenges and meet the increasing need for a deeper understanding of Data Science, particularly in the context of decision-making, an important initiative was realized through the organization of a Webinar and Workshop titled "Python and Data Science: Building a Foundation with Practical Projects." This event was organized by students of the Informatics Engineering Department at Universitas Muhammadiyah Jakarta, aiming to enhance digital literacy and Data Science skills among students and the broader public (Hairani & Amrullah, 2020).

Data Science, as a discipline combining expertise in computer science, statistics, and domain knowledge, has become a crucial foundation for data-driven decision-making (Raschka et al., 2020). Advances in digital technology have transformed the way data are generated, stored, and analyzed, making Data Science increasingly relevant and necessary across various industrial sectors (Castro et al., 2023).

Python, known for its flexibility and ease of learning, has emerged as a leading programming language for data processing and artificial intelligence model development (Fahmi, 2023). With its intuitive syntax and extensive community support, Python enables data scientists to work more efficiently and effectively. Rich Python libraries, such as Pandas, NumPy, and Scikit-learn, provide powerful tools for data analysis, visualization, and machine learning (Fahmi, 2023).

Furthermore, the use of Python for data analysis and visualization has also been successfully applied in community-level initiatives, such as analyzing demographic data at the village level to support development planning (Kencana Putri & Ichsanuddin Nur, 2023).

This demonstrates the wide applicability of Python not only in industrial sectors but also in community empowerment efforts.

The Webinar and Workshop "Python and Data Science: Building a Foundation with Practical Projects" was designed to provide participants with a deep understanding of fundamental Data Science concepts, its benefits, and its practical applications using Python. The webinar session covers the basic principles of Data Science and the application of Python for data analysis, while the workshop offers practical experience through case studies and coding exercises (Dwi Ismiyana Putri et al., 2023). Participants are guided to analyze real-world data and develop simple predictive models.

This study aims to document the implementation of the Webinar and Workshop, analyze its impact on participants, and offer constructive recommendations for the future development of similar programs. It is expected that this research will contribute to increasing public understanding of Data Science and encourage more individuals to pursue careers in this field, thereby helping meet the growing demand for Data Science professionals in Indonesia.

B. METHODS

To realize the activities outlined above, the service team developed a series of steps to implement the program. The activities were conducted in two stages: Public Education in the form of a Webinar and Training in the form of a Workshop. To organize the Webinar and Workshop, the service team followed several key steps

Stage 1 (Activity Dissemination) In this stage, the service team promoted the event through social media by distributing flyers and a registration link (https://forms.gle/zGFfNotPeHCB1z7x8) for the Webinar and Workshop. Flyers were posted on Instagram and broadcasted through WhatsApp groups.

Stage 2 (Preparation of Materials) At this stage, the service team developed the materials for the Webinar and Workshop. The materials were presented in the form of PowerPoint slides and simple project demonstrations, which would later be delivered by the presenters during the sessions.

Stage 3 (Pre-Test Completion by Participants) On Thursday, January 23, 2025, the event began with the preparation by the organizing committee from 08:00 to 09:00 AM. The committee gathered to prepare the event, distribute the Zoom and Virtual Gathering (VG) links, and share the Pre-Test questions with all participants. This step aimed to ensure that all participants could join smoothly and utilize the provided VG backgrounds to support the event's success. Before the sessions started, participants were asked to complete a Pre-Test at https://forms.gle/VAYvhgPyEuaaeQR97, which contained material related to the Webinar and Workshop. The Pre-Test aimed to assess participants' initial understanding of the material, and the results would later be compared to the Post-Test outcomes.

Stage 4 (Public Education through Webinar) During the Webinar, the service team delivered fundamental material to ensure participants gained a solid understanding of Data Science concepts. The expected outcome of this stage was to introduce participants to the role of data scientists and the basics of using Python. The Webinar content began with definitions, benefits, and stages involved in becoming a data scientist, followed by an introduction to Python for data science and the tools commonly used in Python-based data science workflows.

Stage 5 (Training through Workshop) The Workshop served as a practical implementation of the concepts discussed in the Webinar, particularly the stages of data science work. Participants were briefly reintroduced to the data science process and its applications before performing a data analysis project using a Titanic passenger dataset. The analysis was conducted using Google Colab, a cloud-based notebook tool from Google Workspace. Participants had been instructed in advance to prepare the necessary tools to ensure smooth participation during the hands-on session.

Stage 6 (Feedback and Post-Test Completion by Participants) At the end of the activities, participants were asked to provide feedback to evaluate their satisfaction with the delivery of the material, as well as to complete a Post-Test. The feedback form and Post-Test could be accessed at https://forms.gle/PqEufY5zztw1eBnL9 and https://forms.gle/sB4ngnSHyeQhUznM7, respectively. The Post-Test results would be compared with the Pre-Test results to measure participants' improvement in understanding the material presented.

C. RESULTS AND DISCUSSION

The Webinar and Workshop activities were conducted by students of the Informatics Engineering Study Program, Faculty of Engineering, Universitas Muhammadiyah Jakarta. The event was held online via Zoom Meeting Conference through the link https://s.umj.ac.id/FTUMJ-02 on Thursday, January 23, 2025, from 09:00 to 11:30 AM (WIB). A total of 40 participants from various institutions attended the event, with the majority coming from the Informatics Engineering Study Program at Universitas Muhammadiyah Jakarta. The event also featured interactive sessions, such as Q&A discussions, throughout the program. The event agenda was as follows:

Table 1. Event Agenda

Time	Activity	Person in Charge
09.00 - 09.15	Event Preparation, Pre-Test	Ramzy Al Firza Wahyudi
09.15 - 09.20	Opening by MC	Sunatun
09.20 - 09.22	National Anthem "Indonesia Raya"	Sunatun
09.22 - 09.25	Muhammadiyah Hymn	Sunatun
09.25 - 09.30	Qur'an Recitation	Yasir Abduzzhohir
	Presenter 1 CV Reading	Agita Irvanda Saputra
09.30 - 10.15	Webinar	Yasir Abduzzhohir
	Presenter 2 CV Reading	Agita Irvanda Saputra
10.15 - 11.10	Workshop	Muhammad Raihan Saleh
11.10 - 11.15	Q&A Session	Agita Irvanda Saputra
11.15 - 11.30	Post-Test, Attendance, and Feedback	Sunatun
	Photo Session	Ramzy Al Firza Wahyudi

Following this agenda, the stages of the community service activities were carried out as previously outlined:

SOCIETY: Jurnal Pengabdian Masyarakat,
Vol. 4, No. 3 (2025): May, pp. 375-384
E-ISSN:2827-878X (Online -Elektronik)

Stage 1 (Activity Dissemination) In this stage, the service team conducted public dissemination through social media platforms. This aimed to attract prospective participants by distributing a designed flyer, as shown in the figure below.

Figure 1. Activity Flyer

Stage 2 (Preparation of Materials) At this stage, the presenters prepared the event materials in PowerPoint (PPT) format. The materials were structured for easy comprehension and covered several points, including an introduction to Data Science—definitions, main components, benefits, and applications across industries. Additionally, the materials discussed the use of Python in Data Science and relevant tools. The materials are illustrated in the figures below.

Figure 2. Webinar Materials

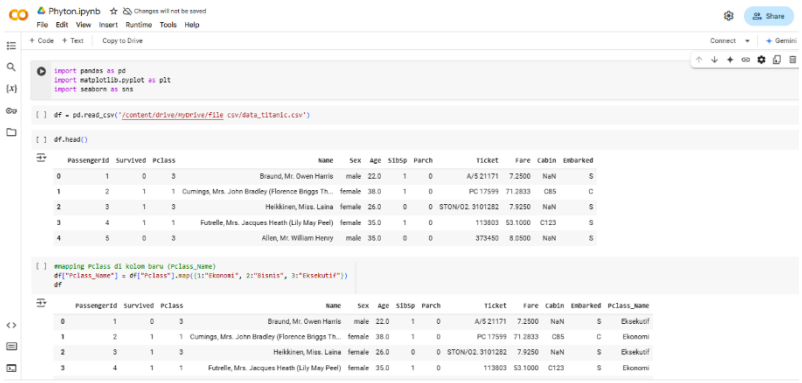

Figure 3. Workshop Materials

SOCIETY: Jurnal Pengabdian Masyarakat,
Vol. 4, No. 3 (2025): May, pp. 375-384
E-ISSN:2827-878X (Online -Elektronik)

Stage 3 (Pre-Test Completion by Participants) At this stage, participants were asked to complete a Pre-Test designed by the service team. The Pre-Test consisted of several questions aimed at assessing participants' prior understanding before the activities commenced. A total of 39 out of 40 participants completed the Pre-Test, showing an initial adequate level of comprehension.

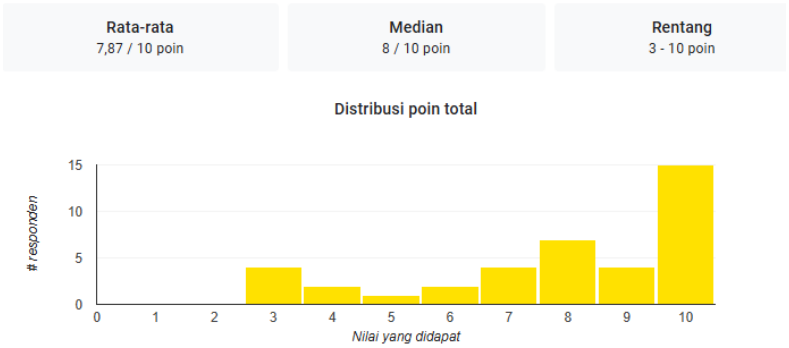

Figure 4. Pre-Test Results

Stage 4 (Public Education through Webinar) In this stage, the Webinar presenter, Yasir Abduzzhohir, delivered the previously prepared materials to the public participants. The materials presented included an Introduction to Data Science with Python. The session covered the definitions and distinctions between data scientists and data analysts, the stages of data science, and its benefits and applications in the industry. Interactive engagement was encouraged through questions posed by both the presenter and participants via the Zoom chat feature.
As a result, participants gained a deeper understanding of the roles and processes involved in data science using Python.

Figure 5. Webinar Material Presentation

The figure shows the presenter explaining the stages of project analysis in Data Science, aiming to familiarize participants with the overall analysis process.

Stage 5 (Training through Workshop) In this stage, the Workshop presenter, Muhammad Raihan Saleh, provided a hands-on implementation of the previously delivered Webinar material. Participants were guided to use Google Colab, a notebook tool from Google Workspace. Prior to the event, participants were advised to prepare this tool to ensure smooth participation. The presenter demonstrated the usage of Google Colab and the step-by-step Data Science process, starting from data analysis to prediction results. Through this practical

session, participants gained a clearer understanding of the data science process, enabling them to achieve more accurate predictions for informed decision-making.

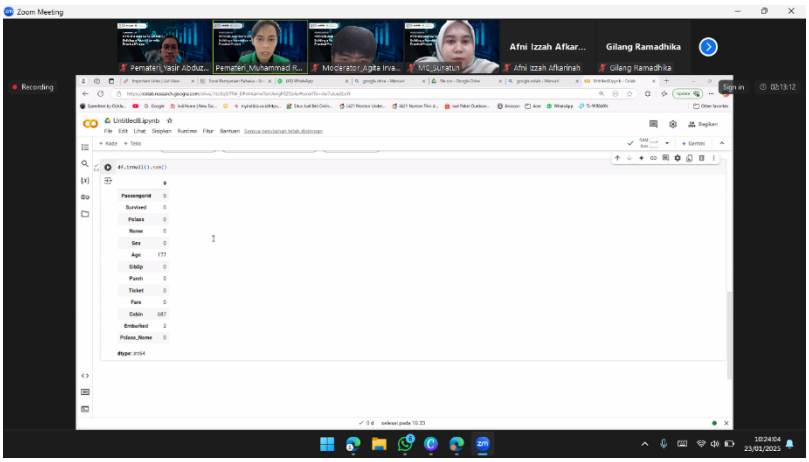

Figure 6. Workshop Material Presentation

The figure shows the steps explained during the data prediction process in Data Science.

Stage 6 (Feedback and Post-Test Completion by Participants) In the final stage, participants were requested to fill out attendance list, feedback forms, and the Post-Test via Google Forms. Feedback was assessed using a Likert scale, consisting of five levels: (5) Strongly Agree, (4) Agree, (3) Neutral, (2) Disagree, (1) Strongly Disagree. The feedback questionnaire included the following statements:

1. Is the Webinar and Workshop material aligned with the Informatics Engineering courses at FTUMJ?
2. Was the Webinar speaker knowledgeable in their field?
3. Was the Workshop speaker knowledgeable in their field?
4. Did the Webinar speaker deliver the material effectively?
5. Did the Workshop speaker deliver the material effectively?
6. Was the online service quality (audio and video) during the Workshop satisfactory?
7. Was the administrative service easy to use?
8. How satisfied were you with this event overall?

Additionally, the Post-Test, containing questions similar to those of the Pre-Test, was used to compare participants' understanding before and after the activities.

Throughout the Webinar and Workshop sessions, participants showed great enthusiasm for the material presented. This is reflected in the feedback forms collected at the end of the sessions, where the majority of participants indicated satisfaction with the materials and delivery.

SOCIETY: Jurnal Pengabdian Masyarakat,
Vol. 4, No. 3 (2025): May, pp. 375-384
E-ISSN:2827-878X (Online -Elektronik)

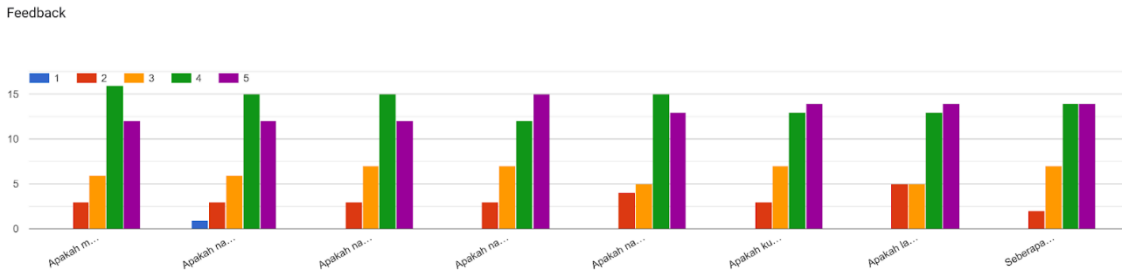

Figure 7. Participant Feedback Results

As shown, 14 out of 37 participants felt satisfied and another 14 participants felt very satisfied with the event. The feedback responses indicated that participants gained new knowledge aligned with the event's theme. Positive participant responses demonstrated that the material delivery was effective and easily understood.

In addition to the feedback, participants completed a Post-Test at the end of the event to measure knowledge improvement.

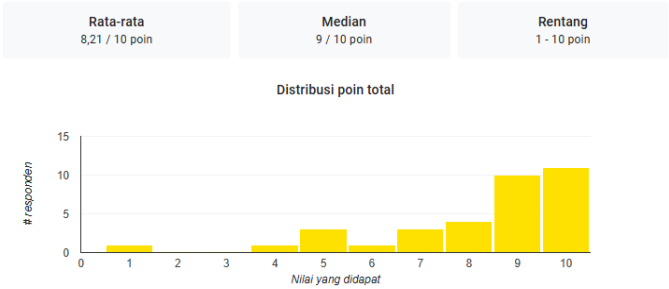

Figure 8. Participant Post-Test Results

A total of 34 participants completed the Post-Test, resulting in an average score improvement from 7.87 (Pre-Test) to 8.21 (Post-Test). Although some questions showed a slight decrease in the percentage of correct answers, the overall understanding of Data Science concepts increased among participants.

D. CONCLUSION

Based on the results of the Webinar and Workshop titled "Python and Data Science: Building a Foundation with Practical Projects" held on January 23, 2025, via the Zoom Meeting Conference platform from 09:00 to 11:30 AM WIB, it can be concluded that the event ran smoothly without any significant obstacles. The event successfully attracted 40 participants from various institutions to learn fundamental concepts of Data Science. Evaluation results showed that participants expressed their satisfaction, as evidenced by 40% of participants reporting being satisfied and 37% reporting being very satisfied with the event. Furthermore, there was an improvement in participants' understanding of Data Science, with the average Pre-Test score increasing from 7.87 to 8.21 in the Post-Test.

E. ACKNOWLEDGEMENTS

The organizing team extends its sincere gratitude to the alumni and the Informatics Engineering Study Program, Faculty of Engineering, Universitas Muhammadiyah Jakarta, for their support and the facilities provided in the implementation of the Webinar and Workshop "Python and Data Science: Building a Foundation with Practical Projects". Thanks to their support, the program activities were successfully carried out.

F. AUTHOR CONTRIBUTIONS

In the webinar and workshop titled "Python and Data Science: Building a Foundation with Practical Projects", each team member had clear roles and responsibilities to ensure the smooth execution of the event and the preparation of the scientific article. Yasir Abduzzhohir, as the chief organizer, was responsible for overseeing the overall event management and the tasks of the team members, in addition to serving as the webinar speaker delivering the material on Data Science. Ramzy Al Firza Wahyudi was responsible for creating promotional content, including flyers and virtual backgrounds, as well as serving as the event Operator. Agita Irvanda Saputra contributed to the development of the learning module and acted as the moderator during the webinar and workshop sessions. Sunatun served as the master of ceremonies during the event and contributed to the preparation of the Community Service Report and journal writing. Muhammad Raihan Saleh served as the workshop speaker, delivering the practical implementation part of the webinar, and created the Pre-Test, Post-Test, and feedback forms to measure participants' learning outcomes. Hendra acted as the academic advisor, providing guidance and support to ensure the smooth running of the webinar and workshop, and overseeing the review of the scientific article. All authors worked collaboratively to ensure the success of the event and the quality of the resulting publication.

G. REFERENCES

Castro, O., Bruneau, P., Sottet, J.-S., & Torregrossa, D. (2023). *Landscape of High-performance Python to Develop Data Science and Machine Learning Applications*.

Dwi Ismiyana Putri, Mardi Yudhi Putra, Sumardiono, Muhammad Surya Apandi, & Harulintang. (2023). Pelatihan data science guna meningkatkan kompetensi aparatur sipil negara dalam perkembangan teknik informasi dan komunikasi. *BEMAS: Jurnal Bermasyarakat*, *3*(2), 81–92. https://doi.org/10.37373/bemas.v3i2.285

Fahmi, M. N. (2023). Implementasi Mechine Learning menggunakan Python Library : Scikit-Learn (Supervised dan Unsupervised Learning). *Sains Data Jurnal Studi Matematika Dan Teknologi*, *1*(2), 87–96. https://doi.org/10.52620/sainsdata.v1i2.31

Hairani, H., & Amrullah, A. Z. (2020). Pelatihan Pengenalan Data Science untuk Meningkatkan Kemampuan dalam Pengolahan Data. *Jurnal Abdidas*, *1*(3), 95–99. https://doi.org/10.31004/abdidas.v1i3.31

Kencana Putri, A., & Ichsanuddin Nur, D. (2023). PENGGUNAAN BAHASA PYTHON UNTUK ANALISIS DAN VISUALISASI DATA PENDUDUK DI DESA SUMBERJO, NGANJUK. In *Jurnal Pengabdian Kepada Masyarakat* (Vol. 3, Issue 3). https://jurnalfkip.samawa-university.ac.id/karya_jpm/index

Rahman, A., Satispi, E., & Setyaningrum, I. (2023). *Jurnal Reformasi Administrasi : Jurnal Ilmiah Mewujudkan Masyarakat Madani Evaluasi Pelaksanaan Kebijakan Kampus Merdeka : Studi Pada Program Magang dan Studi Independen Bersertifikat (MSIB)*. *10*(1), 36–44. http://ojs.stiami.ac.id

Raschka, S., Patterson, J., & Nolet, C. (2020). *Machine Learning in Python: Main developments and technology trends in data science, machine learning, and artificial intelligence*.

Suranti, D., Jumadi, J., Akbar, A. Al, Lianda, D., & Imansyah, M. D. (2022). WORKSHOP PENGENALAN DAN PEMANFAATAN DATA SAINS PADA BIDANG PENDIDIKAN. *JMM (Jurnal Masyarakat Mandiri)*, *6*(3), 2243. https://doi.org/10.31764/jmm.v6i3.8415

Syamsu, M., & Widodo, W. (2021). Peran Data Science dan Data Scientist Untuk Mentransformasi Data Dalam Industri 4.0. *Jurnal Teknologi Informasi (JUTECH)*, *2*(1), 27–36. https://doi.org/10.32546/jutech.v2i1.1540