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Conferences Deep and Machine Learning in Artificial Intelligence about Diabetics for Student Indonesia-Thailand

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Abstract

Background: The rapid advancement of artificial intelligence, particularly deep learning and machine learning, has transformed healthcare, education, and industry, yet many university students remain disconnected from applied understanding of these technologies, especially in addressing diabetes-related health challenges, creating an urgent need for inclusive learning initiatives. International seminars that combine academic expertise, interdisciplinary dialogue, and contextual examples offer a humanistic pathway to reduce anxiety, build confidence, and encourage students to participate actively in technological problem solving while fostering ethical sensitivity, social responsibility, and collaborative learning across cultural and institutional boundaries within higher education systems globally today and sustainably inclusive.
Aims: This community service activity aimed to enhance students' conceptual and applied understanding of deep learning and machine learning in artificial intelligence through an international seminar focusing on diabetes-oriented healthcare applications.
Methods: The program employed an offline international seminar involving Indonesian and Thai speakers, interactive presentations, case studies, and two-way discussions attended by approximately two hundred fifty students, with effectiveness evaluated using a pretest–posttest design.
Result: Results indicated substantial improvement in participants' understanding, with mean scores increasing from fifty-six to eighty-eight, alongside heightened engagement, confidence, and critical awareness of ethical artificial intelligence applications in healthcare.
Conclusion: The seminar effectively translated initial educational urgency into meaningful learning outcomes, demonstrating that human-centered international community service initiatives can strengthen artificial intelligence literacy. Future programs should expand practical laboratories, longitudinal evaluation, and interdisciplinary collaboration to support ethical innovation in health technology and student empowerment.

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INTRODUCTION

Deep learning is a form of machine learning that enables computers to learn from experience and understand the world through hierarchical concepts (Janiesch et al., 2021; Patil et al., 2024; Taye, 2023). Deep learning models are capable of recognising images, text, speech, and data patterns to generate accurate insights. In addition, deep learning can assist in completing tasks that typically require human intelligence, such as describing images or transcribing audio files into text. Conventionally, these models focus on identifying relationships among data. The models are trained

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using large datasets to recognise patterns within the data. The output generated from learned inputs in deep learning is referred to as generative deep learning.

Generative deep learning extends pattern recognition by enabling the creation of new data patterns and generating its own unique outputs (Creely & Blannin, 2025; Iqbal et al., 2025; Ribas et al., 2025). There are two fundamental models underlying generative deep learning, namely modern generative artificial intelligence models and foundation models (He et al., 2025; Leung et al., 2025; Liu et al., 2023). These models utilise large scale technologies and are trained on extensive datasets to perform complex tasks. Deep learning plays an important role in daily life, as it is applied in various everyday products such as digital assistants, code generators, voice activated television remote controls, fraud detection systems, and automatic facial recognition technologies (Mahya et al., 2023; Irawan & Fatkhurohman, 2024; Wolniak et al., 2024). Deep learning is also applied in the automotive sector for object detection, as well as in computer vision to automatically extract information and insights from images and videos.

Machine learning is a branch of artificial intelligence that enables computer systems to learn and improve performance without being explicitly (Huertas-Abril, 2025; Sarker, 2021b). It utilises algorithms that learn from data and generate predictions or decisions based on patterns identified within the data (Dritsas & Trigka, 2025; Razzaq & Shah, 2025; Soori et al., 2023). Machine learning systems have the capability to acquire data autonomously based on defined instructions. Machine learning algorithms require extensive numerical computation, relying on mathematical problem solving methods that iteratively update solution estimates. Machine learning involves the development and evaluation of algorithms that enable computers to learn functional relationships from datasets.

Deep learning is a machine learning concept that is based on artificial neural networks (Kufel et al., 2023; Sarker, 2021a; Sharma et al., 2021). Artificial intelligence consists of techniques that enable computers to imitate human behaviour and reproduce decision making processes in order to perform complex tasks independently or with minimal human intervention. However, limitations exist because humans often find it difficult to explicitly describe all the knowledge required to perform complex tasks. Machine learning addresses these limitations by automating the development of analytical models to perform cognitive tasks such as object detection and natural language translation (Deng et al., 2020; Yao et al., 2025; Zuhair et al., 2024).

The rapid advancement of artificial intelligence, particularly in the fields of deep learning and machine learning, has profoundly transformed various sectors, including healthcare, education, and industry. Despite this global development, many university students, especially in developing regions, continue to experience limited access to structured learning opportunities that connect advanced AI concepts with real-world applications. This gap generates concern, as students may become passive consumers of technology rather than active contributors to innovation. In the context of healthcare challenges such as diabetes, the lack of early exposure to applied artificial intelligence further limits students' capacity to understand how technological solutions can address societal problems. Therefore, there is an urgent need for inclusive, interdisciplinary, and internationally oriented educational activities that not only introduce AI concepts but also cultivate critical thinking, confidence, and ethical awareness among students.

Responding to this urgency, the present community service activity was designed to provide an international seminar on deep learning and machine learning in artificial intelligence, with a particular focus on healthcare applications related to diabetes. The primary objective of this program was to enhance students' conceptual understanding of artificial intelligence while fostering an interactive learning environment that encourages dialogue, curiosity, and collaboration between Indonesian and Thai academic communities. Beyond knowledge transmission, the activity aimed to empower students by demonstrating that advanced technologies are accessible, meaningful, and relevant to their daily lives and future professional roles. Through participatory discussions, case studies, and expert insights, this community service initiative sought to build not only technical literacy but also hope and motivation, positioning students as potential agents of positive technological change in society.

METHOD

The method applied in this activity was an offline or face to face approach conducted at Grand Kolopaking, Kebumen. The seminar was held in the second floor hall of Grand Kolopaking. The number of participants attending the international seminar was approximately 250 individuals, consisting of students from UMNU Kebumen, primarily from the Informatics Engineering study programme as well as students from other study programmes. The activity was conducted over a duration of four hours, starting from 8.00 a.m. until 12.00 p.m. The international seminar presented material related to deep learning and machine learning in artificial intelligence. The material was delivered by two speakers, with the main speaker being Prof. Mongkol Kongtungmon, Ph.D., Chief Technology Officer of Suratec Co., Ltd., Thailand. The second speaker was a lecturer from the Informatics Engineering study programme, namely Akhmad Fadjeri, S.Pd., M.Kom.

Participants of the International Seminar on Deep Learning and Machine Learning in Artificial Intelligence consisted of the academic community of UMNU Kebumen, particularly students of the Informatics Engineering study programme. The participants also included lecturers from the Informatics Engineering study programme. The majority of student participants were first and third semester students. Participants who attended the international seminar received participation points, additional assignment scores, and active participation credits that contributed to graduation requirements.

RESULTS AND DISCUSSION

Results

The International Seminar on Deep Learning and Machine Learning in Artificial Intelligence concerning diabetes was organised by the Informatics Engineering study programme of Universitas Ma'arif Nahdlatul Ulama and involved students from Universitas Ma'arif Nahdlatul Ulama Kebumen, particularly those from the Informatics Engineering study programme. The international seminar was conducted offline and took place at Grand Kolopaking, Kebumen. The seminar discussed deep learning and machine learning within the scope of artificial intelligence. The presentation of material on deep learning and machine learning was delivered by Mr Akhmad Fadjeri, a lecturer in the Informatics Engineering study programme at UMNU Kebumen. The material covered concepts related to search engines and machine learning supported by artificial intelligence, as well as strategies for optimising their use according to specific needs. Artificial intelligence was presented as a tool to support machine learning and internet based search engines. The main speaker of the international seminar was Prof. Mongkol Kongtungmon, Ph.D., Chief Technology Officer of Suratec Co., Ltd., Thailand.

The table below presents the sequence of activities of the International Seminar on Deep Learning and Machine Learning in Artificial Intelligence organised by the Informatics Engineering study programme of Universitas Ma'arif Nahdlatul Ulama Kebumen on Friday, 13 December 2024.

Table 1. Sequence of Seminar Activities

Number	Activity	Person in Charge
1.	Opening	Master of Ceremony
2.	Singing of the Indonesia Raya anthem and the UMNU March	Seluruh Peserta
3.	Opening remarks by the Chair of the Organising Committee	Fahmi Fachri, S.M., S.Kom.
4.	Opening remarks by the Dean of the Faculty	Dr. Alek Andika, M.Pd.
5.	Opening remarks by the Rector of UMNU Kebumen	Dr. H. Imam Satibi, M.Pd., I
6.	Presentation of material by Speaker I on the application of artificial intelligence technology in Indonesia, including case studies and skill development strategies	Akhmad Fadjeri, S.Pd., M.Kom.
7.	Presentation of material by Speaker II on artificial intelligence trends in healthcare and opportunities for innovation	Prof Mongkol Kongtungmon, Ph.D.

8.	Question and answer session	Master of Ceremony
9.	Presentation of certificates and awards to the speakers	Fahmi Fachri, S.M., S.Kom.
10.	Group photo session	Master of Ceremony
11.	Closing	Master of Ceremony

The participants' enthusiasm was evident through their active involvement during the question and answer session as well as their strong interest in the topics discussed, particularly the application of artificial intelligence in the health sector, especially early detection of diabetes using predictive models based on machine learning. Many participants stated that the seminar broadened their understanding of how artificial intelligence is not limited to the field of information technology, but also plays a significant role in social and healthcare sectors. The discussion took place in a two way manner, reflecting lively interaction and the participants' strong desire for up to date knowledge. In addition to cognitive benefits, this activity also strengthened students' soft skills in participating in international scale academic forums. Participants did not merely receive material passively, but were also trained to think critically, ask questions systematically, and express their opinions with confidence. The success of this seminar demonstrates that a participatory based educational approach is able to enhance students' academic capacity and character. It is expected that similar activities can be continued and expanded, so that more young generations are inspired to explore and utilise artificial intelligence for the benefit of the wider community.

To measure the effectiveness of the international seminar, participants' understanding of deep learning and machine learning in artificial intelligence related to diabetes was assessed using a pretest–posttest design (Figure 1). The assessment focused on conceptual comprehension of artificial intelligence fundamentals, machine learning workflows, deep learning models, and their applications in healthcare, particularly in diabetes detection and prediction. The results show a clear improvement in participants' understanding following the seminar. The mean pretest score was 56, indicating limited initial comprehension of advanced artificial intelligence concepts. After the seminar, the mean posttest score increased to 88, demonstrating a substantial enhancement in conceptual understanding. The relatively small error bars suggest consistent learning gains among participants.

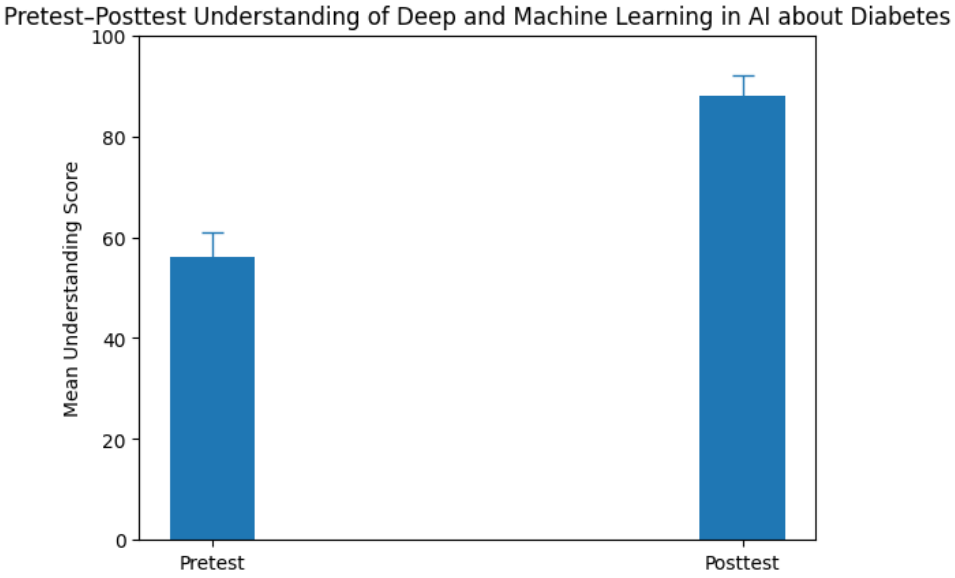

Figure 2. Pretest–Posttest Understanding of Deep and Machine Learning in AI about Diabetes
Source: Primary Data

The marked increase in posttest scores indicates that the seminar was effective in strengthening participants' understanding of deep learning and machine learning applications in the

context of diabetes. Prior to the activity, many participants were unfamiliar with how artificial intelligence models operate beyond basic definitions. Through structured presentations, real-world case studies, and interactive discussions, abstract concepts such as neural networks, predictive modeling, and healthcare data processing became more accessible and meaningful. The offline, face-to-face format contributed to high engagement, allowing participants to ask questions, clarify misconceptions, and relate theoretical knowledge to practical healthcare challenges. The participatory learning environment supported not only cognitive development but also increased confidence in engaging with advanced technological topics.

Synthesizing the quantitative improvement and qualitative observations, the findings demonstrate that international seminars can function as effective community service platforms for enhancing artificial intelligence literacy among university students. The significant pretest–posttest improvement confirms that when complex technologies such as deep learning and machine learning are presented through human-centered, context-based approaches, students are capable of meaningful comprehension and critical reflection. These results support the broader conclusion that inclusive, interdisciplinary, and collaborative educational initiatives are essential for preparing students to apply artificial intelligence ethically and creatively in addressing real-world health issues such as diabetes.

Discussion

The findings of this community service activity strongly confirm the urgency identified in the Introduction regarding the limited exposure of university students to applied artificial intelligence concepts, particularly deep learning and machine learning in real-world contexts such as healthcare. The significant improvement in participants' understanding, as evidenced by the pretest–posttest results, demonstrates that structured and context-based educational interventions are capable of transforming abstract technological knowledge into meaningful comprehension. This outcome aligns with previous studies emphasizing that deep learning and machine learning are often perceived as complex and inaccessible unless they are introduced through practical and contextualized learning experiences (Janiesch et al., 2021; Sarker, 2021a).

The marked increase in posttest scores reflects not merely cognitive acquisition but also a shift in students' learning orientation, from passive reception to active intellectual engagement. Prior to the seminar, participants exhibited limited familiarity with how artificial intelligence models operate beyond surface-level definitions, a condition that mirrors concerns raised in the literature regarding students becoming passive technology users rather than critical innovators (Patil et al., 2024; Taye, 2023). Through interactive presentations and real-world healthcare case studies, particularly in the domain of diabetes, the seminar effectively bridged this gap and fostered deeper conceptual clarity.

The participatory and two-way learning approach adopted in this seminar played a critical role in enhancing learning outcomes. The opportunity for dialogue, questioning, and reflection enabled participants to internalize complex ideas such as neural networks, predictive modeling, and data-driven healthcare decision making (Deng et al., 2020; Maguire & White, 2025; Yao et al., 2025). This reinforces the argument that artificial intelligence education must prioritize human-centered pedagogical strategies to ensure accessibility, ethical awareness, and long-term relevance.

Furthermore, the international dimension of the seminar, involving collaboration between Indonesian and Thai academic communities, contributed substantially to the learning experience. Exposure to global perspectives on artificial intelligence applications in healthcare enriched students' understanding of how deep learning and machine learning are applied across different technological and cultural contexts. This finding resonates with prior research highlighting the importance of interdisciplinary and cross-cultural learning environments in preparing students for global technological challenges (Leung et al., 2025; Ramli et al., 2025; Zuhair et al., 2024).

Beyond technical competence, the seminar also fostered students' confidence, motivation, and sense of agency in engaging with advanced technologies. Qualitative observations revealed that participants began to view artificial intelligence not as an intimidating or distant domain, but as a field that is learnable, applicable, and socially meaningful. This humanistic outcome aligns with the broader vision of artificial intelligence education (Kufel et al., 2023; Tzirides et al., 2024; Wolniak et al., 2024), which emphasizes the integration of technological literacy with ethical sensitivity and social responsibility.

Synthesizing these findings, the Discussion underscores that international seminars function as effective community service platforms for addressing the urgent educational gap identified in the Introduction. When deep learning and machine learning are presented through contextualized, participatory, and human-centered approaches, students are capable of achieving meaningful understanding and critical reflection. These results affirm that inclusive and collaborative educational initiatives are essential for preparing students to apply artificial intelligence creatively and ethically in addressing real-world health challenges such as diabetes, thereby fulfilling the core objectives of community service in higher education.

Implications

The outcomes of this community service activity imply that international, context-based seminars are an effective strategy for strengthening students' literacy in deep learning and machine learning, particularly when applied to real-world health challenges such as diabetes. The significant improvement in participants' understanding indicates that abstract artificial intelligence concepts become more accessible when delivered through applied, interdisciplinary, and participatory learning models. These implications highlight the importance of integrating artificial intelligence education into broader academic and community engagement agendas, ensuring that technological advancement is accompanied by ethical awareness, critical thinking, and social relevance.

Contribution of Community Service

This community service initiative contributes meaningfully to the empowerment of university students by bridging the gap between advanced artificial intelligence theory and practical healthcare applications. By facilitating knowledge exchange between Indonesian and Thai academic communities, the program strengthened international collaboration and promoted cross-cultural perspectives on artificial intelligence in health contexts. Furthermore, the activity reinforced the role of higher education institutions as agents of social transformation, demonstrating that community service can function as a platform for disseminating advanced scientific knowledge while fostering confidence, motivation, and professional aspiration among students.

Limitations

Despite its positive outcomes, this activity has several limitations that should be acknowledged. The number of participants was relatively limited, which may constrain the generalizability of the findings. The evaluation relied primarily on short-term pretest–posttest measurements, limiting insights into long-term knowledge retention and skill transfer. In addition, the seminar format emphasized conceptual understanding rather than hands-on model development, which may restrict deeper technical mastery of deep learning and machine learning frameworks. These limitations suggest that the findings should be interpreted as indicative of immediate educational impact rather than comprehensive learning outcomes.

Suggestions

Based on these limitations, future community service and research initiatives are recommended to incorporate longer-term training programs that include practical laboratories, coding workshops, and project-based learning focused on healthcare datasets. Expanding participant diversity across academic disciplines and institutions would enhance interdisciplinary learning and scalability. It is also suggested that future programs employ longitudinal evaluation methods to assess sustained learning outcomes and professional development trajectories. By strengthening continuity, practical engagement, and evaluation rigor, similar initiatives can further contribute to the development of ethically grounded and socially responsive artificial intelligence practitioners.

CONCLUSION

The results of the International Seminar on Deep Learning and Machine Learning in Artificial Intelligence consisted of learning materials on search engines and machine learning in artificial intelligence, delivered by the first and second speakers. The seminar was conducted offline at Grand Kolopaking, Kebumen, with a total of approximately 250 participants. The seminar was organised by the Informatics Engineering Study Programme of UMNU Kebumen. The materials on machine

learning and deep learning were provided to the seminar participants with the aim of enhancing their understanding and knowledge of artificial intelligence applications. Through this seminar, participants were able to gain a clear understanding and apply the knowledge in their daily lives. The seminar on Deep Learning and Machine Learning in Artificial Intelligence also serves as a relevant reference for community service practitioners, particularly those who intend to adopt themes related to deep learning, machine learning, and artificial intelligence.

The conclusion of this activity conveys a fundamental message, namely that technology, regardless of how complex its name may be, such as deep learning and machine learning, ultimately exists to bring humans closer to meaningful understanding rather than merely technological advancement. Through this seminar, students not only learned about concepts and algorithms, but also experienced learning as an enjoyable process that stimulates curiosity and fosters hope. From the warm and enthusiastic seminar environment emerged a new awareness that artificial intelligence is not something distant or overly complex, but rather something that can be understood, utilised, and even developed to support a better quality of life. This reflects the true essence of community service, where knowledge becomes a bridge that touches hearts and opens pathways to the future.

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AUTHOR CONTRIBUTION STATEMENT

HW conceptualized and designed the community service program, coordinated the international seminar, delivered core materials, and drafted the original manuscript. MK contributed as the main international speaker, provided expertise on deep learning and machine learning applications in healthcare, and critically reviewed the manuscript for scientific relevance. NY assisted in program organization, data collection, and documentation of seminar activities. IU supported participant coordination, data analysis, and refinement of the manuscript's structure and language. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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