

A Review on Leveraging Technology for Enhanced Pregnancy Care

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Abstract— Technological advancements have the potential to revolutionize prenatal care, improving outcomes for expectant mothers and their unborn children. This comprehensive review explores the efficacy, challenges, and potential benefits of integrating User Experience/User Interface (UX/UI), Natural Language Processing (NLP), Machine Learning (ML), and Data Mining in pregnancy care. The UX/UI aspect focuses on user-centered design, providing intuitive interfaces that cater to the unique needs of expectant mothers. NLP techniques enable the early detection of pregnancy abnormalities, allowing for timely interventions and personalized care. ML algorithms aid in predicting outcomes and identifying potential issues, empowering healthcare providers to make informed decisions. Data mining uncovers hidden patterns within large datasets, facilitating early intervention strategies and improved prenatal care. Future directions involve refining UX/UI design, incorporating domain expertise in NLP models, exploring advanced ML algorithms, and expanding data mining analysis to include diverse influencing factors. Integrating expert knowledge, personalized approaches, ethical considerations, and clinical validation is crucial. Multidisciplinary collaborations will drive the development and implementation of technology-driven solutions. The paper concludes by discussing the potential benefits of integrating technology into routine prenatal care practices, including improved access to care, enhanced patient engagement, and better health outcomes. However, it also acknowledges the challenges and limitations that need to be addressed for wider adoption of technology-driven approaches.

Keywords— *Pregnancy Care, Health and Wellness, Prenatal Care*

I. INTRODUCTION

In recent years, there have been remarkable advancements in the field of pregnant care, driven by the integration of technology and innovation. These developments have the potential to revolutionize the way prenatal care is delivered, providing enhanced support and improved health outcomes for expectant mothers. This review paper aims to provide a comprehensive overview of the current landscape of pregnancy care and explore the potential benefits and challenges of leveraging technology in improving maternal health

outcomes. Pregnancy is a crucial period in a woman's life that requires specialized care to ensure the well-being of both the mother and the developing fetus. Comprehensive prenatal care plays a vital role in monitoring the health of expectant mothers, identifying any potential complications, and providing appropriate interventions. However, traditional approaches to pregnancy care face numerous challenges, including limited access to healthcare resources, communication barriers, and the need for frequent in-person visits. The integration of technology offers promising solutions to overcome these challenges and enhance pregnancy care. Various technological interventions, such as mobile applications, wearable devices, telemedicine, and data analytics, have emerged as valuable tools in supporting expectant mothers and healthcare providers throughout the pregnancy journey. These technologies provide opportunities for personalized care, remote monitoring, real-time communication, and access to educational resources, empowering women to actively participate in their own healthcare management.

This review paper aims to critically examine the existing literature on the utilization of technology in pregnancy care, drawing upon a wide range of studies and research findings. By synthesizing the findings from these studies, we seek to provide insights into the efficacy, challenges, and potential benefits of technology in improving prenatal care and supporting expectant mothers. Additionally, we will explore the proposed system details for enhancing pregnancy care through the integration of technology, including the Knowledge Hub, SOS Feature, Due Date Tracker, Report Manager, and Calendar and Task Reminder. This paper will discuss the

results of the research conducted thus far, highlighting the innovative approaches and outcomes designed to enhance pregnancy care. It will also delve into the interview details, which were conducted with pregnant mothers, partners, midwives, and midwifery specialized nurses, to gather their perspectives and finalize the requirements for the proposed system. Now we will discuss the structure and content of the sections in details, providing an overview of the key information covered in each section.

Section II, provides a comprehensive review of existing literature on the utilization of technology in pregnancy care, including mobile apps, wearable devices, and telemedicine, and their impact on maternal health outcomes. It synthesizes the findings from various studies to offer insights into the efficacy, challenges, and potential benefits of technology in improving prenatal care. Section III, we describe the methodology used to gather relevant data and insights for this review. This includes conducting surveys to gather feedback and opinions from pregnant mothers and midwives regarding the use of technology in pregnancy care and we present the proposed system details for enhancing pregnancy care through the integration of technology. The system aims to leverage innovative approaches such as a user-friendly mobile application, wearable devices, and remote monitoring systems to provide personalized care and improve maternal health outcomes. Section VI, the final section summarizes the key findings and implications of technology in pregnancy care. It discusses the potential benefits of integrating technology into routine prenatal care practices, highlights the challenges and limitations that need to be addressed, and outlines future research directions and opportunities for innovation in pregnancy care, emphasizing interdisciplinary collaborations and evidence-based practices for successful implementation.

II. LITERATURE REVIEW

Advancements in technology have opened new possibilities for improving prenatal care and providing support to expectant mothers. Through the lenses of user

experience/user interface (UX/UI), data mining, natural language processing (NLP), and machine learning (ML), several studies have shed light on the efficacy, challenges, and potential benefits of technology in this domain.

D. User Experience

Making an application for pregnancy care in a community with a variety of cultures and languages has been a focus of Wally Smith's study (Smith *et al.*, 2017). The project specifically targeted Vietnamese women and prioritized the involvement of local health providers. The study emphasized the importance of understanding the community's healthcare history and cultural practices when developing a prototype web application called "WE_HELP" for prenatal care. The application aimed to provide content in both English and Vietnamese languages, considering the diverse linguistic needs of the community.

Deborah Lupton's study (Lupton and Pedersen, 2016) explored how Australian women used pregnancy and parenting apps and their feedback on the information provided, as well as their concerns about data privacy and security. The study surveyed women to identify the features they desired in such apps. The findings highlighted that while pregnancy self-tracking apps aimed to provide autonomy and control, the lack of acknowledgment of individual circumstances could leave women feeling disempowered.

Gunawan Wicahyono study (Wicahyono *et al.*, 2019) presented a mobile application for pregnancy monitoring, allowing pregnant mothers to track their fetus's heartbeat, body weight, and movement. The application aimed to facilitate healthcare professionals' monitoring of the mother and baby's health during pregnancy. The study suggested the inclusion of image processing capabilities in the app to interpret weight scales and automatically record women's movements.

Azham Hussain's study (Hussain *et al.*, 2018) focused on the usability testing of an interactive mobile application for expectant mothers. The

study identified five usability attributes based on Jakob Nielsen's principles: effectiveness, efficiency, enjoyment, recallability, and learnability. The results revealed challenges related to icon design and navigation, emphasizing the need to optimize user experience and remove distractions.

Siti Nazazihah (Rahmat, Jamal and Safitri, 2019) introduced "My Gynae Helper", a pregnancy tracker application that allows users to log doctor appointments and monitor the health of their unborn child without frequent visits to a doctor. The research highlighted the significance of extreme programming techniques, which improved product development by emphasizing communication, feedback, respect, fearlessness, and simplicity.

Lily Indriani Octavia's study (Octovia *et al.*, 2018) discussed "mHealth," an Indonesian mobile application for tracking maternal and child health and nutrition. The study emphasized the importance of ongoing financing, strong leadership, and the scarcity of health practices and resources related to nutritional care for mother and child.

Gabriela Friday's research (Frid, Bogaert and Chen, 2021) involved a systematic evaluation of pregnancy mobile apps, considering factors such as comprehensiveness, price, privacy, connectivity, and ease of use. The study used a scoring system to assess the features and components needed by pregnant women and healthcare providers. The results highlighted the importance of healthcare professionals evaluating apps before recommending them to patients.

Hanna M. Brown's study (Brown *et al.*, 2019) reviewed iPhone apps for pregnancy care, assessing their quality, inclusion of behavioural change techniques, and nutritional information. The study identified several apps that were developmentally appropriate, safe, and cost-effective in terms of using behavioural change techniques. However, it also pointed out the need for improvement in apps lacking

nutritional information or adequate space for recording food intake.

Claire Rothschild's study (Rothschild *et al.*, 2022) examined the a mobile application's viability and generalizability for gathering more health data during pregnancy. The study's pilot focused on collecting data on medical problems, medication prescriptions, and substance use. The findings suggested that mobile applications could be a practical and affordable tool for collecting health data from expectant women for research purposes.

These studies collectively emphasize the need for culturally sensitive app design, user empowerment, usability optimization, privacy and security considerations, and the inclusion of relevant features to support pregnancy care. By understanding the diverse needs and concerns of pregnant women, app developers and healthcare professionals can create effective and user-friendly applications to enhance prenatal care.

E. Data Mining

In the field of data mining, Hussam Alshraideh and Mwaffaq Ootom conducted research (Hussain *et al.*, 2018) to develop a framework for predicting the mode of delivery. Their study utilized delivery records from a private hospital in Jordan, comprising various characteristics such as age, weight, pregnancy number, and previous caesareans. They employed the Weka software to build a model and assess the accuracy of different classification algorithms. The J48 algorithm emerged as the most accurate in predicting the mode of delivery. However, the study acknowledged the need to explore other factors that may influence delivery methods and to validate the system using additional test data.

Dian Sa'adillah study (Sa *et al.*, no date) focused on developing an expert system for identifying early pregnancy abnormalities using Artificial Neural Networks (ANN) and the Back Propagation method. By analysing medical records of individuals, the study aimed to predict pregnancy problems. The system consisted of 17 input factors and five output

classes, distinguishing between a healthy early pregnancy and various disorders. The findings revealed that ANN could predict pregnancy problems with an accuracy of 78.248%. Detecting such problems early on is crucial for preventing miscarriages and ensuring normal fetal growth. However, the study emphasized the need for further improvement, including enhancing the training and testing data to achieve more accurate results. Additionally, expert knowledge should be incorporated to validate the system's outputs.

These two data mining studies demonstrate the potential of utilizing predictive models and expert systems in the field of pregnancy care. By analysing relevant data and employing algorithms like J48 and ANN, researchers can gain insights into predicting the mode of delivery and identifying early pregnancy abnormalities. Such advancements in data mining can contribute to improving prenatal healthcare and supporting healthcare professionals in making informed decisions. However, both studies recognize the importance of continuous refinement and validation to enhance the accuracy and reliability of the developed systems.

F. Natural Language Processing

In the realm of natural language processing, Xiao Luo conducted a study (Liu *et al.*, 2021) utilizing the BERT model to identify and annotate pregnancy-related queries on a community Q&A website. The research compared BERT-based models with classical machine learning techniques and assessed two attention mechanisms: BERT's built-in self-attention mechanism and an additional attention layer. The findings revealed that BERT-based models outperformed conventional models, with the BERT model enhanced by an extra attention layer achieving even higher precision. The study also highlighted the different ways in which the two attention processes approached annotating relevant content, showcasing their potential as feature selection techniques for text mining.

Building upon this concept, Joo Luis Zeni Montenegro proposed (Luis *et al.*, 2018) a Multifaceted Natural Language Generation (NLG) Model to support postpartum mothers

through speech and text interactions. This model aimed to improve the well-being of mothers after childbirth by generating responses using an ontology model and retrieval-based strategies. The study conducted a case study and developed a conversational agent architecture model to simulate the idea. The results showed improved response time and comparable answer accuracy, particularly for semantic queries. The multifaceted NLG model suggested in this study could serve as a specialized Frequently Asked Questions (FAQ) resource for postpartum assistance. The researchers intend to further enhance the model, include additional elements, and gather feedback from mothers and healthcare professionals.

Expanding on the use of natural language processing in maternal monitoring, Sandra Hakeim presented (Sa, 2022) a user-centered design for a chatbot system aimed at informing expectant mothers about potential pregnancy risk symptoms. The system utilized natural language processing (NLP) and Telegram chatbot technology, following the danger sign monitoring standards from the WHO and the Ministry of Health of Indonesia. NLP was employed to understand user inputs, which were then evaluated by the decision system. The chatbot provided individualized monitoring results and instructional information to users. The study evaluated the usability of the chatbot system and obtained a moderate score on the system usability scale. The chatbot system's purpose is to enhance maternity care by providing early warning signs of danger and relevant information in an interactive and efficient manner, particularly in areas with limited healthcare resources. Future work includes improving the chatbot's design and database.

These three studies showcase the potential of natural language processing and AI-based systems in pregnancy care. Xiao Luo's research demonstrated the effectiveness of BERT models in identifying and annotating pregnancy-related queries. Joo Luis Zeni Montenegro proposed a multifaceted NLG model to support postpartum mothers through speech and text interactions. Sandra Hakeim's study focused on a user-centered chatbot system

for maternal monitoring, utilizing NLP to inform expectant mothers about potential pregnancy risks. By combining these approaches, healthcare professionals can leverage AI technologies to provide personalized and efficient support throughout the pregnancy and postpartum journey.

G. Machine Learning

In the field of machine learning for pregnancy care, Rupali Sawant proposed (Sawant and Gaikwad, 2016) a hybrid prediction approach that combines the Naive Bayes kernel and Markov model. This approach considers various factors, including internal and external elements such as vitamin and mineral levels, age, and BMI index. The goal of this technique is to determine the normality or abnormality of a pregnancy and, if abnormal, identify the appropriate vitamin and mineral supplements to restore it to a normal state without harming the unborn child. By leveraging the Naive Bayes kernel and Markov model, this method aims to improve pregnancy outcomes and reduce the incidence of birth abnormalities, particularly in countries with high populations of pregnant women and high birth defect rates.

During the COVID-19 pandemic, Tianzhu conducted research (Lyu and Liang, 2022) utilizing national electronic health records and machine learning techniques to identify predictive risk factors for poor maternal outcomes. The study employed the Temporal Events Detector for Pregnancy Care (TED-PC), a rule-based method, as well as machine learning models such as random forest, XGBoost, support vector machines, and recurrent neural networks. By analysing a cohort of 191,403 pregnancies, the research aimed to construct a clinical decision support system that can prevent adverse maternal outcomes and enhance overall maternal health. Additionally, the study planned to evaluate the content and clinical validity of the phenotyping process and perform external validation tests using data from different sources.

The hybrid prediction approach proposed by Rupali Sawant, and the research conducted by Tianzhu share a common goal of leveraging machine learning techniques to improve pregnancy care outcomes. Sawant's approach

focuses on identifying and addressing abnormalities during early pregnancy, while Tianzhu's research aims to identify risk factors for poor maternal outcomes, especially during the COVID-19 pandemic. Both studies demonstrate the potential of machine learning in enhancing pregnancy care by providing personalized predictions and decision support systems. By combining these approaches and further validating their findings, healthcare professionals can make informed decisions to ensure the well-being of both the mother and the unborn child, ultimately improving maternal health on a broader scale.

In terms of UX/UI, the study conducted by Sandra Hakeim (Sa, 2022) stands out, as it focuses on designing a user-centered chatbot system for maternal monitoring. By utilizing NLP, the system can effectively identify user inputs and provide personalized monitoring results and instructional information. This interactive and efficient approach can help overcome barriers related to limited healthcare resources and enable early warning indications of danger during pregnancy. The findings of the study underscore the importance of creating intuitive and user-friendly interfaces that empower expectant mothers to access valuable information and support.

Data mining plays a crucial role in uncovering patterns and insights from large datasets to improve prenatal care. The research by Hussam Alshraideh and Mwaffaq Ootom (Alshraideh and Khayyat, 2016) exemplifies the use of data mining approaches in predicting the mode of delivery. By analysing 2866 delivery records, they developed a model using the J48 algorithm that can identify potential delivery process issues. This demonstrates how data mining can provide valuable insights into the factors influencing specific distribution methods and aid in decision-making for healthcare providers. NLP techniques have been employed to address various aspects of prenatal care. Dian Sa'adillah study (Sa *et al.*, no date) utilized Artificial Neural Networks (ANN) and the Back Propagation method to predict early pregnancy abnormalities. The research demonstrated the potential of ANN in detecting pregnancy problems with an accuracy of 78.248%. However, the authors highlight the need for

further improvement by enhancing the training and testing data, as well as incorporating expert knowledge for better validation. This emphasizes the importance of combining NLP techniques with domain expertise to ensure the accuracy and reliability of the results.

ML techniques offer significant opportunities for enhancing prenatal care and supporting expectant mothers. Xiao Luo's study (Liu *et al.*, 2021) focused on using the BERT model to identify and annotate pregnancy-related queries. By comparing BERT-based models with classical machine learning techniques, the research showcased the superior performance of BERT in question categorization. The study also highlighted the potential of attention mechanisms as feature selection techniques for text mining in general. Additionally, Rupali Sawant's research (Sawant, 2015) presented a hybrid prediction approach that combined Naive Bayes kernel and Markov model to improve pregnancy outcomes. By considering various factors, including internal and external elements, the approach aimed to determine the normality or abnormality of a pregnancy and guide appropriate interventions.

These studies highlight how the technology has the potential to revolutionize prenatal care and provide pregnant women with assistance. By focusing on UX/UI design, data mining, NLP, and ML techniques, researchers aim to provide valuable insights into the efficacy of technology-driven approaches. Challenges such as the need for improved training data, the integration of expert knowledge, and the assessment of clinical validity are acknowledged, and future research endeavours are outlined to address these limitations. Technology adoption enables healthcare professionals to give timely and individualized support to pregnant moms, thereby improving maternal health outcomes and having a favourable influence on prenatal care.

III. METHODOLOGY

DATA GATHERING

In pursuit of profound understanding of the intricacies surrounding pregnancy care, a meticulous series of interviews was undertaken. Targeting a diverse array of participants including pregnant individuals, their partners, midwives, and specialized nurses, these insightful conversations unfolded within the confines of

the Paediatric Ward at a prominent General Hospital in Colombo.

Table 1: Interview Details

Who	Why	How	Where
People who are pregnant, their partners, midwives, and specialized nurses	To gather information on experiences & needs of pregnant mothers, their partners and the healthcare providers who assist with pregnancy & childbirth	Questions were designed to be open-ended, close-ended & follow-up questions	In-person Paediatric Ward, General Hospital, Colombo

The formulation of interview questions reflected a nuanced approach, designed to elicit both open-ended narratives and precise, closed-ended responses. The strategic incorporation of follow-up questions further facilitated a profound exploration of the participants' multifaceted experiences and perspectives. The expansive range of topics covered encompassed the provisioning of maternal healthcare, the intricacies of due date prediction, challenges posed by language barriers in healthcare, the integration of digital platforms, the potential advantages of a multilingual pregnancy care mobile app, staying abreast of cutting-edge advancements in pregnancy care, encounters with intricate cases, and the distinctive challenges encountered by midwives in delivering quality maternal healthcare. During the interviews, the participants offered illuminating insights, revealing pivotal themes that permeate the landscape of pregnancy care. Among these revelations, the prevalence of teenage pregnancies emerged as a major concern, demanding necessary solutions for ensuring optimal care. Issues surrounding the accuracy of manual due date predictions were underscored, with a resounding call for more sophisticated methodologies. Language barriers were identified as formidable obstacles in the realm of effective maternal healthcare, sparking considerations for innovative solutions, such as the potential benefits inherent in a multilingual mobile app.

Table 2: Interview Results

Interview Questions	Key Findings/Analysis
1. Experience in providing maternal healthcare	Teenage pregnancies are common, indicating the need for specialized care for young mothers.
2. Manual predication of due dates	Manual methods of predicting due dates may have limitations and could benefit from improved accuracy.
3. Difficulties due to language barriers	Language barriers can pose challenges in providing care to expectant mothers
4. Use of digital platforms in maternal healthcare	Lack of digital platforms in maternal healthcare to support care delivery.
5. Mobile app for pregnancy care	A mobile app providing pregnancy care information in multiple languages would be helpful for expectant mothers.
6. Staying up to date with advancements in pregnancy care	Healthcare providers need to stay informed about the latest advancements in the field.

7.	Addressing language barriers with a mobile app	A mobile app in multiple languages could enhance communication in maternal healthcare.
8.	Challenging cases in pregnancy care	Maternal healthcare involved handling challenging cases that require specialized knowledge and skills.
9.	Challenges facing midwives in maternal healthcare	Lack of education among mothers and the need for a better support system are key challenges for midwives.
10.	Confidence in manual due date prediction	The level of confidence in manually predicting due dates may vary depending on the healthcare providers.

Beyond these revelations, the interviews highlighted the importance of continuous education and staying up with the latest advancements in the dynamic field of pregnancy care. Participants articulated the challenges inherent to their practices, particularly emphasizing the need for perpetual learning and skill development among midwives. The interviews, therefore, acted as an invaluable conduit for unearthing the predominant challenges faced by midwives, including the lack of maternal education and instances of unreported pregnancies resulting in uneducated mothers. Finally, the interviews conducted with pregnant individuals, their partners, midwives, and midwifery specialized nurses provided a rich source of information for understanding the experiences and needs of those involved in pregnancy care. The insights gathered from these interviews will contribute to informing the development of a technology-driven solution to enhance pregnancy care and address the identified challenges.

H. Proposed System

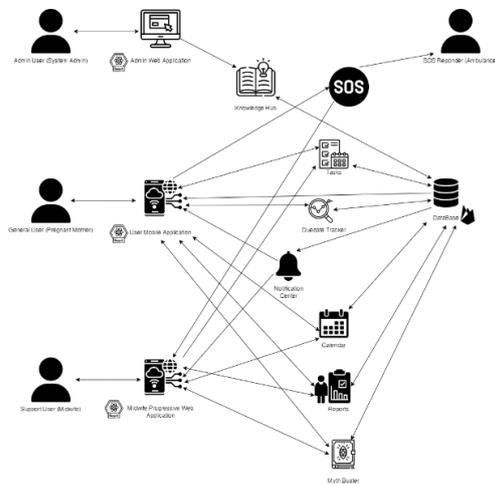


Figure 1: Proposed System Design

Our visionary system embarks on a transformative journey, deploying innovative methodologies to elevate maternal health outcomes and deliver a personalized continuum of care throughout the intricate stages of pregnancy. Central to this groundbreaking initiative are key components meticulously designed to revolutionize the landscape of pregnancy care:

1. Knowledge Hub: At the core of our application lies the Knowledge Hub, an expansive repository teeming with meticulously curated pregnancy-related information. This intellectual reservoir is intelligently segmented into categories aligning with distinct pregnancy stages,

covering a spectrum of topics including nutrition, exercise, prenatal tests, and common discomforts. Drawing from authoritative medical sources, the Hub employs advanced machine learning algorithms to tailor content seamlessly to the user's profile and specific stage of pregnancy, ensuring information is not only reliable but also comprehensible.

2. SOS Feature: An indispensable lifeline within our application is the SOS feature, offering instantaneous access to emergency services. Beyond its rapid-response functionality, the app serves as a vault for critical medical information, enabling swift and comprehensive data transfer in high-stakes emergency situations, fostering a new dimension of responsiveness and efficacy in critical times.

3. Due Date Tracker: Catalyzing meticulous progress tracking throughout the pregnancy journey is our state-of-the-art Due Date Tracker. This multifaceted feature empowers mothers to monitor crucial milestones, track fetal development stages, and stay attuned to upcoming due dates. Employing sophisticated algorithms, the tracker calculates, and updates due dates based on user-inputted information, ensuring accuracy and providing an invaluable tool for informed maternal decision-making.

4. Report Manager: Spearheading efficiency in prenatal care management is the Report Manager, a pioneering tool for seamless organization of prenatal medical reports. Users can effortlessly upload and store digital copies of their medical records, with intuitive sorting options by date and customizable tagging for quick access. This feature not only streamlines the user experience but also facilitates seamless sharing of reports with healthcare providers, fostering enhanced doctor-patient communication and reducing reliance on physical documents.

5. Calendar and Task Reminder: Augmenting the app's comprehensive utility is the Calendar with Task Reminders, a dynamic feature engineered to aid mothers in efficiently managing their daily activities. Beyond basic reminders, this feature suggests and prompts users on pivotal tasks such as medication timings, doctor's appointments, and exercise sessions. Remarkably adaptable, it allows for personalized customization based on the user's unique lifestyle and specific needs, embodying a holistic approach to maternal well-being.

In essence, these meticulously crafted features—The Knowledge Hub, SOS Feature, Due Date Tracker, Report Manager, and Calendar and Task Reminder—reflect a paradigm shift in pregnancy care. They seamlessly integrate cutting-edge technology to not only address the unique challenges of maternal health but to propel the field towards unprecedented advancements and positive outcomes for expectant mothers.

IV. CONCLUSION AND FUTURE DIRECTIONS

As we draw conclusions from this comprehensive review, it becomes evident that the integration of technology into prenatal care holds immense potential for the improvement of

outcomes and support for expectant mothers. The user-centered design principles encapsulated in the proposed system, coupled with the insights gained from data mining, NLP, and ML studies, underscore the holistic nature of technology-driven solutions in addressing the multifaceted challenges in pregnancy care.

Looking forward, continuous refinement of UX/UI design emerges as a critical aspect to ensure the accessibility and intuitiveness of interfaces. The potential for NLP techniques to detect early pregnancy abnormalities presents a promising avenue, demanding further research to enhance models through domain expertise and expanded datasets. Machine learning's role in predicting outcomes necessitates exploration into more sophisticated models, such as deep learning algorithms, to bolster prediction accuracy.

Data mining, with its ability to unearth hidden patterns, should extend its reach into a broader spectrum of influencing factors, incorporating innovative algorithms for heightened accuracy. The incorporation of expert knowledge stands out as essential for the validation of technology-driven approaches, emphasizing the importance of collaborative efforts between healthcare professionals and technologists.

Personalization emerges as a key theme for future directions, where technology-driven solutions can tailor interventions based on individual needs, demographic factors, and real-time data. Ethical considerations must remain at the forefront, with a focus on privacy protection, data security, and informed consent to ensure widespread trust and acceptance of technology in prenatal care. Rigorous validation studies involving diverse populations become imperative to establish the clinical validity of these innovative systems.

The collaborative spirit between researchers, healthcare providers, and technologists remains crucial in advancing prenatal care. Multidisciplinary teams hold the potential to

develop holistic solutions that integrate medical knowledge, technological advancements, and user-centric design principles. In conclusion, the integration of technology in prenatal care is not merely a technological augmentation; it represents a paradigm shift that, with meticulous attention to detail, can significantly enhance maternal health outcomes and redefine the landscape of pregnancy care.

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