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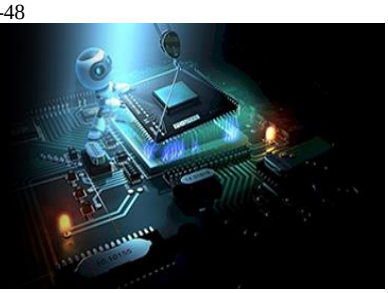

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To the research on creating an AI-powered cloud-based android app for efficient online consultation

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Abstract
Despite having plenty of its main food commodities produced domestically, India has serious issues with hunger and food insecurity due to severe inequality, broad economic suffering, high unemployment, and inefficient distribution networks. As a result of the nationwide closure of schools due to the epidemic, children were deprived of their midday meal. The Anganwadi Center-based Supplemental Nutrition for ICDS programmed in rural regions have also been severely affected. In India, there is a triple burden of malnutrition - undernutrition, overweight/obesity, and hidden hunger or micronutrient deficiencies - combined with non-communicable diseases (NCDs). To combat this, an effective nutritional intervention is crucial. The biggest causes of health loss in India are anaemia, maternal and child malnutrition.

Keywords: AI, cloud-based, android app, and online

Introduction
Investigate how artificial intelligence (AI) is being used to build CDSS that are connected with electronic health records (EHR). Explore the ways in which these tools facilitate evidence-based decision-making, notify healthcare practitioners of possible problems in real-time, and provide advice. Talk about how proactive healthcare is aided by AI-driven predictive analytics that are connected with EHR. In order to improve patient outcomes, it is important to investigate the application of machine learning for risk assessment, illness progression prediction, and preventative action recommendation.
Investigate how incorporating AI into EHR improves processes and healthcare operations as a whole. Think about ways to enhance resource allocation, automate mundane operations, and lessen administrative loads. Explain how AI helps electronic health record systems be more interoperable and standardized in their data handling. Learn how AI may help standardize data formats, facilitate communication across healthcare organizations, and back up all-encompassing patient care.
Think about patient confidentiality, data security, and the appropriate use of AI algorithms as you discuss the ethical concerns surrounding AI integration with EHR. Talk about how using AI for healthcare informatics should always be done in an ethical manner. Give examples of actual applications of AI integration with EHR that have been effective. The practical influence on patient care and healthcare efficiency may be shown by highlighting the results, problems, and lessons gained from these situations. Make recommendations on where we should go from here in terms of furthering the integration of AI with EHR. Regulatory concerns, data governance, and the need of continuing research to improve AI's skills in healthcare informatics are some of the many obstacles that may be discussed.
The incorporation of Artificial Intelligence (AI) into Electronic Health Records (EHRs) is pivotal to the impending digital transformation in the healthcare business. With the help of artificial intelligence, electronic health records (EHRs) have already changed the game when it comes to storing and retrieving patient data. But there are obstacles to this integration as well. The pros and cons of using AI in electronic health records.

Literature review
Kapur, Gayatri *et al.* (2023). From public agencies to private residences, digitization has shifted the focus of everyone. There is a greater need to digitise paper records because to the

rising awareness of COVID-19. Many people believe that moving health records to digital storage would solve many present issues, such as remote consultation, predictive diagnosis, trend analysis, personalized healthcare, and continuous health monitoring. Electronic health record (EHR) adoption and implementation in India is going at a snail's pace. This study aims to highlight the intricate structure of the Indian healthcare system in order to introduce EHR solutions that are helped by artificial intelligence. Thematic analysis was used to debrief and analyse 30 participants' interviews that took place over 12 weeks. Considered as crucial for effective adoption are factors such as cost, ignorance, replacement anxiety, false news, healthcare system fragmentation, improper use of alternative technology, and paradigm changes. Businesses developing an intelligent EHR solution for the Indian market could benefit from our research. Electronic medical file the healthcare system in India Machine learning Modernization through digital means

Racine, Eric *et al*. (2019). Imaging and diagnosis, risk analysis, lifestyle management and monitoring, health information management, and virtual health assistance are just a few of the innovative healthcare applications of artificial intelligence (AI) that are currently the subject of intense research. There will be far-reaching advantages in many domains, such as faster imaging, better predictive screening, and less waste and expense in healthcare. On the other hand, there are a lot of ways in which therapeutic instruments powered by AI may put widely accepted moral and ethical norms to the test. In this brief piece, we will discuss three possible issues with artificial intelligence (AI) in healthcare: (1) consent and dynamic information, (2) ownership and transparency, and (3) privacy and discrimination. We go into the ways they affect the values of patients/clients, doctors, and healthcare institutions, and we provide solutions to these problems. The ethical difficulties that arise from AI might really be a chance for businesses to expand, according to our proposal.

Nguyen, An-Loc *et al*. (2023). The advent of AI has the potential to revolutionise almost every facet of human existence and the way we live on Earth. Artificial intelligence (AI) has sparked heated debates throughout the globe due to the fact that it poses both immediate and long-term benefits and dangers to humankind. The widespread use of AI in several industries has contributed to the technology's global fame, and these industries include healthcare, education, commerce, and more. Concerning the present state and potential future improvements, the use of AI in healthcare has garnered the most interest among all areas in recent years. Using prior research as a foundation, this study will examine the pros and cons of artificial intelligence (AI) in healthcare, and then assess the possibilities for its future integration into the industry.

Ara, Anjuman *et al*. (2024). Examining the revolutionary effects of mHealth's integration of AI and Big Data on healthcare systems, this systematic study delves into the topic. Examining 25 scholarly publications, the review explores the use, advancements, and inherent difficulties of artificial intelligence and big data in different healthcare contexts. Artificial intelligence (AI) and big data (Big Data) greatly improve diagnosis accuracy, tailor treatment plans to each individual, and simplify healthcare administration, according to the results. Having said that, there are several complications associated with this technical development. Ethics, data privacy and security, and keeping people at the centre of healthcare are some of the most pressing problems. Using fair and representative data sets is essential, and the evaluation stresses the danger of relying too much on AI. The incorporation of artificial intelligence into healthcare procedures, albeit showing great promise, needs strict regulation and moral direction. Harmonizing technical innovation with ethical, egalitarian, and human-centered healthcare practices is crucial for the effective deployment of AI and Big Data in healthcare, according to the review. In order to fully reap the advantages of this integration, which might lead to better patient outcomes and more efficient operations if handled properly, careful management of the obstacles is essential.

Bertl, Markus *et al*. (2023). Healthcare delivery and results might be drastically altered by the advent of artificial intelligence (AI). Nevertheless, research indicates that limiting attention to AI algorithms alone results in poor adoption rates. The healthcare industry must methodically incorporate AI. Based on this methodology, this study analyses the present state of systematic AI assistance in healthcare, as well as future prospects, by synthesising relevant research and author observations. With an eye on improving patient care, reducing workloads for healthcare workers, and optimising employee performance, this article explores the many uses of artificial intelligence (AI), which range from illness prediction to personalised medicine. However, there are a number of obstacles to the widespread use of AI in healthcare, including a lack of impartial data sets, poor connection, and ethical considerations.

Methodology

Evaluation of the efficacy of digital diet consultation tool

In the final phase of the study, the developed android application – ‗My Dietitian'- was digitally provided to different smartphone users using social media platforms (Whatsapp/ Facebook) and through print media to access the Google form link for downloading the application and questionnaire; thus, to get feedback on the usage pattern and comfort. An online survey for a period of three months was carried out using the link The questionnaire attached to the link was circulated among 15 experts including a statistician, registered dietitians, academicians, software professionals, psychologist and general population having digital literacy for validation. The android application could be downloaded as a complimentary (free of charges) service from Google play store using the following link, which was given as:

Validated questionnaire comprising of 25 questions, having online consent option and Five-point Likert scale ranging from - strongly disagree‖ to - strongly agree‖ criteria (where 1 denotes strongly disagree, 2 denotes disagree, 3 denotes neutral, 4 agree and 5 strongly agree options) and finally a feedback section to record comments and suggestions in the Google form is appended as Annexure IV. The results obtained were analyzed statistically for cumulative percentage analysis. Further, in the advanced analysis, exploratory statistical tools were used in the study as it utilized variables as a scoring card. The data collected was then consolidated and segregated against predefined tables. Accordingly, the analysis of data in the study was done with both qualitative and quantitative techniques. The statistical analysis was done in two stages. The first stage consisted of examining the descriptive statistics of the measurement

items and assessed the reliability and validity of the measure applied in this study. The second stage tested the proposed research model and this involved assessing the contributions and significance of the manifest variables path coefficients. The data were analyzed via SPSS 20.0 for Windows. Descriptive statistics were used to describe and summarize the properties of the mass of data collected from the respondents. Parametric statistics like one way ANOVA and Z-test were used for comparison of the factors considered between different levels of the demographic variables. A level of 0.05 was established a priori for determining statistical significance.

Data analysis

Evaluation of the efficacy of digital diet consultation tool

The collection of medical records in combination with other personally identifiable information made population research including sensitive data. The most critical aspects of this situation were providing evidence and features for authorization, protecting the database from unauthorized access, and communicating with the database over a secure protocol Although the results were varied, several studies found that users were more likely to adhere to their diet plans when using smartphone applications rather with the more traditional approach of keeping handwritten food diaries Additionally, 45.5% of the healthcare professionals surveyed (including dietitians, physicians, and nurses) have offered their patients nutrition app alternatives. Utilisation of smartphones for research and health promotion applications has been a part of advanced technical evolutions. Despite being accessible on most smartphone platforms, research studies have only investigated a small number of diet and nutrition apps for their impact on health promotion effectiveness. Because the Google Play Store uses an in-built algorithm to determine which applications are relevant and display them as a consolidated data set, sorting the results of the number of app installations proved to be a challenging task. Within the three-month time frame, 500+ individuals downloaded "My Dietitian," and 541 people filled out the Google Form survey. At the conclusion of six months “after publishing it to the Google Play store, the investigator noticed 887 app registrations.

Demographic characteristic of the respondents (N=541)

The section that follows discusses the respondents' demographics.

Gender of participants in the study (N=541)

Among those who took part in the survey, more women than men did so [404 (74.7%)] compared to 137 (25.3%).

Table 1 displays the age groups of the respondents from 21 to 60 years old. The age groups with the highest number of responses were those between 21 and 30 years old, those between 31 and 40 years old, and those less than 21 years old received the lowest number of points.

Table 1: Age categories of the respondents (N=541)

Age in years	Frequency	Percent
<21	33	6.1
21-30	191	35.3
31-40	127	23.5
41-50	99	18.3
51-60	54	10.0
>60	37	6.8
Total	541	100.0

Age categories

Table 2 displays the percentage distribution of the respondents' occupation data. There were 149 people involved, or 27.5% of the total, from the healthcare industry; 131 people, or 24.2%, were from other professions.

Table 2: Occupation of the respondents (N=541)

Occupation	Frequency	Percent
Healthcare professionals	149	27.5
Academicians	54	10.0
IT Professionals	35	6.5
Others	131	24.2
Unemployed	50	9.2
Students	122	22.6
Total	541	100.0

Widodo *et al*. (2020) found that 17.17 million people actively used the device to access digital information, indicating that the current generation is glued to their devices. The conventional function of a mobile phone, which was previously limited to making calls, has been revolutionized by the advent of smartphones and its many apps, providing instantaneous access to an abundance of resources worldwide. Lends credence to the idea that people's access to information has been greatly enhanced by the mobility and portability of smartphones. In terms of how often people use their cellphones, 538 (99.4%) of the 541 respondents used their phones every day, while just 3 (0.6%) did not.

Country of residence (N=541)

Among the 504 people who filled out the online poll, 93.2% were Indian residents. People from various Asian nations and non-resident Indians (NRIs) settled in the UAE, making up 6.8% of the total (n = 37).

Residence in India (n = 504)

Among Indian citizens, those from Tamil Nadu (n = 33, 6.5%) and Kerala (n = 452, 89.7%) were the most numerous. Table 3 also shows the same thing.

Table 3: Residence in India (n=504)

Name of states	Frequency	Percent
Kerala	452	89.7
Tamil Nadu	33	6.5
Karnataka	4	0.8
Arunachal Pradesh	2	0.4
Maharashtra	4	0.8
Telangana	7	1.4
West Bengal	2	0.4
Total	504	100.0

Role of the designed app in providing first hand nutritional guidance (N=541)

Users would unabashedly adopt better habits if smartphone applications could create dynamic behaviour alterations more effectively than dietary recommendations, according to Howe *et al*. (2016). Among the participants, 269 (or 49.7 percent) thought the app was helpful for giving personalized dietary advice. In a similar vein, 178 people (32.9%) voiced their strong agreement.

Analyze the efficacy of the developed cloud based digital diet consultation application

A cloud-based digital nutrition consulting software was evaluated for its effectiveness using confirmatory factor analysis. The results are shown in Table 4.

H_0: Construct E1 to E9 has no influence on Efficacy

H_1: Construct E1 to E9 has significant influence on Efficacy

Table 4: Model fit Indices for Confirmatory factor analysis (CFA) for Efficacy analysis

	χ2	DF	P	Normed χ2	GFI	AGFI	NFI	TLI	CFI	RMR	RMSE A
Efficacy	18.723	17	.345	1.101	.992	.980	.993	.999	.999	.010	.014
Recommended value			≥0.05	<5	>0.9	>0.9	>0.9	>0.9	>0.9	<0.08	<0.08

The latent constructs were considerably loaded with all of the features. The fit indices' values suggested that the measurement model was somewhat well-fitting the data. The regression coefficients are shown in Table 5.

Table 5: Regression Coefficients for Efficacy analysis

Factors/ Latent Variables (Dependent Variable)	Construct (Independent Variable)	Regression Coefficient	Critical Ratio (C.R)	*p*	Variance explained (%)	Average variance extracted	Composite reliability	Discriminant validity
Efficacy	E1	0.807	25.940	<0.001	65.2	0.501	0.987	0.708
	E2	0.814	26.414	<0.001	66.3			
	E3	0.848	28.970	<0.001	71.9			
	E4	0.885	32.435	<0.001	78.4			
	E5	0.715	20.814	<0.001	51.2			
	E6	0.564	14.814	<0.001	31.8			
	E7	0.522	13.432	<0.001	27.2			
	E8	0.515	13.210	<0.001	26.5			
	E9	0.569	14.985	<0.001	32.4			

The regression coefficient values for each of the constructs are more than 0.4. Therefore, Efficacy is greatly affected by all of these characteristics.

Understand the user choice for selecting the application as a personal diet consultation tool

Table shows the results of a single sample Z test that we used to test the hypothesis presented earlier. According to the table, a test is considered statistically significant if the p-value is less than 0.05. Based on the data, we can reject the null hypothesis and say that the digital diet advising app had an excellent or high degree of accuracy and clarity, at least over 75%.

H_0: Construct UC1 to UC5 has no influence on User's choice

H_1: Construct UC1 to UC5 has significant influence on User's choice

Model fit Indices for Confirmatory factor analysis (CFA) to understand User's choice

Table 6: Model fit Indices for CFA to understand User's choice

	χ2	DF	P	Normed χ2	GFI	AGFI	NFI	TLI	CFI	RMR	RMSEA
Users' choice	1.402	3	.705	.467	.999	.995	.999	1.005	1.000	.004	.070

User choice for selecting the application as a personal diet consultation tool

Second only to UC1 in terms of app use was UC2 (Users find the app informative and helpful). Finally, in third and fourth place, we have UC3 (the app would improve attitudes towards healthy eating and lifestyle) and UC5 (satisfaction with overall application and its features). UC4 was the final app that consumers desired to use since it would alter their habits. You can see the data's regression coefficients in Table 7.

Table 7: Regression coefficients

Codes	Regression Coefficients	Statements	Rank
UC1	0.818	Usage of this app in the future	2
UC2	0.866	Application is informative and beneficial to users	1
UC3	0.723	App would change attitudes towards healthy diet and lifestyle	3
UC4	0.580	App would bring about a behavioral change in the users	5
UC5	0.592	Satisfaction with overall application and its features	4

Conclusion

People spent more time on their mobile phones than any other media because they were more personal computing and communication devices. Measures that offered customers individualized, optimal choices among several self-monitoring approaches also necessitated the expansion of research efforts. Other features that might be helpful for users include the ability to be profiled to determine the optimum technique of self-monitoring, automatic follow-up, alert management for users who are severely sick and

connected to a helpline, and continual feedback choices to improve the ease of use and acceptance. More and more user-friendly self-monitoring devices that engage and interact with users to improve adherence should be the focus of future research.

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