BESLENME VE DİYETETİKTE YAPAY ZEKA UYGULAMALARI

ARTIFICIAL INTELLIGENCE APPLICATIONS IN NUTRITION AND DIETETICS

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Özetçe—**Yapay zeka (AI), amacı düşünce süreçlerini, öğrenme yeteneklerini ve bilgi yönetimini taklit etmek olan bir bilgisayar bilimi dalıdır. Deneysel ve klinik tıpta giderek artan uygulama sayısı dikkat çekicidir. Beslenme ve diyetetik alanında yapay zeka uygulamaları oldukça yeni ve önemli bir alandır. Bireylerin kullanımına beslenme ile ilgili farklı uygulamalar sunulmaktadır. Bireysel beslenmenin öneminin anlaşılması, yapay zeka uygulamalarında artışa destek olmaktadır. Besin tercihleri ve diyetle alımın değerlendirilmesi gibi farklı uygulamaların sağlığın geliştirilmesinde önemli bir rol oynayabileceği düşünülmektedir. Araştırmacılar, besin tüketiminin değerlendirilmesi konusunda bazı zorluklar [besin tüketim sıklığını veya miktarını hatırlamak gibi] yaşayabilmektedir. Besin tüketimin değerlendirilmesinde kullanılan bazı uygulamalar bu zorlukların giderilmesine katkı sağlamaktadır. Aynı zamanda araştırmacıların işini kolaylaştırmakta ve geleneksel yöntemlere göre daha güvenilir sonuçlar sağlamaktadır. Beslenme ve diyetetik alanında kullanılacak uygulamaların dezavantajlarının dikkate alınarak geliştirilmesi oldukça önemlidir. Yapay zeka uygulamalarının hem sağlığın geliştirilmesinde, hem de beslenme durumunun değerlendirmesi ve izlenmesine katkı sağlayacağı düşünülmektedir.**.

Anahtar Kelimeler—*beslenme ve diyetetik; yapay zeka; sağlık.*

Abstract—**Artificial intelligence (AI) is a branch of computer science whose purpose is to imitate thought processes, learning abilities, and knowledge management. The increasing number of applications in experimental and clinical medicine is striking. Artificial intelligence applications in the field of nutrition and dietetics is a fairly new and important field. Different apps related to nutrition are offered to the use of individuals. The importance of individual nutrition has also triggered the increase in artificial intelligence apps. It is thought that different apps such as food preferences and dietary intake can play an important role in health promotion. Researchers may have some difficulties such as remembering the frequency or amount of intake in assessment of dietary intake. Some applications used in the assessment of food consumption contribute to overcoming these difficulties. Besides, these apps facilitate the work of researchers and provide more reliable results than traditional methods. The apps to be used in the field of nutrition and dietetics should be developed by considering the disadvantages. It is thought that artificial intelligence applications will contribute to both the improvement of health and the assessment and monitoring of nutritional status.**

Keywords—**nutrition and dietetics; artificial intelligence; health.**

I. INTRODUCTION

Artificial intelligence (AI) is finding more and more applications in experimental and clinical medicine as a branch of computer science whose purpose is to mimic thought processes, learning abilities and knowledge management. Nowadays, there has been an expansion of AI applications in biomedical sciences. Artificial intelligence opportunities increase rapidly in the field of medical diagnosis, risk estimation and supporting therapeutic techniques. [1]. Firstly, computer scientist John McCarthy proposed "artificial intelligence" in 1955 [2]. Although AI was initially managed as a department of computer science, it has now become a concept that is discussed in almost all

disciplines. Artificial intelligence applications in the field of nutrition and dietetics is a fairly new and important field. Different apps related to nutrition are offered to the use of individuals. The importance of individual nutrition has also triggered the increase in artificial intelligence apps. [3]. It is extremely important to explain the practices in this field with scientific evidence [4, 5]. It is thought that different apps such as food preferences and dietary intake can play an important role in health promotion [3].

II. DIETARY ASSESSMENT

Researchers have major challenge about assessment of dietary intake. The evaluation of dietary intake can use different methods such as 3 day food records, 24-h recall or food frequency questionnaire [6].

Researchers face many challenges when deciding which method is the best [5]. Issues of participant burden, motivation and willingness to accurately report diet, and participant literacy and memory should be considered. Also, the time to enter and analyze diet data, and therefore the availability of resources to accurately analyze dietary recalls, must be taken into account before starting a study [7].

All methods of dietary assessment have limitations. For example, a single 24-hour recall reflects only foods consumed in a single irregular day and may be less representative of an estimated individual's intake. However, two or more 24-hour recall or food recording are required to estimate normal dietary intake distributions [8]. One limitation of food records is that they can cause awareness bias [9]. FFQs can lead to overreporting of average dietary intakes and can rely on the participant's ability to accurately recall portion sizes and frequencies, similar to 24-hour recalls. Also, the FFQ may be interrupted; therefore, its ability to stay focused can be challenging for indices [10]. For these reasons, new dietary assessment methods are needed for the well-being of individuals and researchers.

Tracking dietary assesment of individuals is important in evaluating the nutritional status for both dieticians and clients [11]. It has been observed that there is an increase in the use of artificial intelligence applications in nutrition and dietetics. For example; the food consumption records, which are evaluated by taking photos of the foods consumed, are guiding in evaluating the nutritional status. These photos taken with mobile phones make the application practical and applicable [3].

By this apps, the dietician can follow the recommended diet plan and the clients can also control themselves to their diet adaptation [12]. Monitoring regular food intake in hospitalized patients plays a critical role in reducing the risk of malnutrition associated with the disease. While various methods have been developed to estimate food intake, there is still a clear demand for a more reliable and fully automated technique, as this can increase data accuracy and reduce both participant burden and healthcare costs [13].

However, the notifications are based on self reporting is seen as a disadvantage [12]. Other disadvantages; the visual of foods might change while they are prepared. At the same time, some foods may appear visually similar or the same food may look different depending on the angle and lightning. Therefore, the preparation process of databases in apps is very important [14, 15]. Despite these disadvantages, these practices may contribute in the future improvement of dietary assessment of individuals, providing individual monitoring and positive behavioral changes [3].

There are many apps for dietary assessment. Keenoa [Montreal, Quebec, Canada] is a smartphone imaged–based dietary assessment app that recognizes and identifies food items using artificial intelligence and permits editing of food journals in real time. Unique to other apps, Keenoa is accessed only by registered dietitians licensed to practice in Canada with the idea that dietitians are trained to identify food items that were missed or misidentified by the user. Therefore, the advantage of Keenoa is that dietitians can adjust the food items to generate accurate nutrient profiles of an individual's dietary intake. Currently, the app is being used by practicing dietitians in Canada. From a researcher's perspective, using Keenoa to assess dietary intakes would reduce systematic errors associated with data entry [7].

Sullivan et al. Conducted a study to evaluate a multi-component method for capturing nutrient intake, which used observation, photography, and an innovative computer program. To assess reliability and accuracy, multiple responsible employees (Res) independently conducted nutrient intake assessments on simulated meals; each RE's results relating to energy intake were compared to those from the other REs and to those obtained by pre- and post-meal weighing of the food items. System efficiency was assessed by having REs perform independent assessments on the same set of simulated meals using either the new or traditional hospital method for which the REs had to document each food item served and then find the items in a computer database–steps that were automated in the new method. Evaluation of this Multiple Component Method clearly demonstrates it is a reliable and accurate technique for obtaining assessments of patient energy intake in a hospital setting. The method provides a detailed accounting of energy intake while saving significant time for the healthcare team [16]. In our country there is not any apps which evaluated by taking photos of the foods according to our knowledge.

III.   CONCLUSION

The apps to be used in the field of nutrition and dietetics should be developed by considering the disadvantages and advantages. The further apps will help both in health promotion and monitoring and evaluation of dietary assessment.

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