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DIGITALIZATION OF UZBEK ECONOMY: DATA MANAGEMENT IN NATIONAL HEALTHCARE SYSTEM WITH THE USAGE OF ASR

Bahtiyor Anvarovich Islomov
Doctor of Economics, Professor of Tashkent State University of Economics,
Rajabbek Kaxramonovich Teshayev
Doctoral student at International Westminster University in Tashkent.
rateshayev@wiut.uz

Abstract: The Republic of Uzbekistan is one of many developing nations that are using a variety of techniques to digitize their healthcare systems. The adoption of Electronic Health Records (EHRs), which represent the patient's personal information such as illnesses, anamneses, medical history, and medications, is frequently the main emphasis of this process. Some nations are using Automatic Speech Recognition (ASR) systems as a voice-to-text powered typing tool since doctors often find that typing by hand takes too much time. ASR's integration into the healthcare system presents a number of opportunities to contribute to the country's socioeconomic digitization, particularly in the healthcare sector. The research on the advantages of voice-to-text enabled typing in healthcare settings is summarized in this paper. The study involved 120 physicians from regional hospitals and the collection of primary data, which included about 20 indicators.

Keywords: Automatic Speech Recognition (ASR), Voice-to-text enabled typing, Electronic Health Records (EHR), Digitalization, IT innovation.

Summary of the literature review: Because EHRs improve data management, improve patient care, and facilitate research, their integration into the medical field has completely transformed the healthcare systems of many industrialized and developing nations [1]. Unbeknownst to them, the extensive use of EHRs has also created new difficulties, especially in the field of data entry, where physicians must manually type patient data for hours on end. Physicians who have historically typed patient information by hand frequently show hesitancy while working with electronic health records. They frequently point to a greater workload and less time for patient interaction as the primary justification for this [2].

The substantial influence of the ASR system on the caliber of medical data and the volume of data input into electronic health records has been thoroughly examined in previous studies, which we have attentively examined. According to a Turkish survey, the usage of electronic health records is almost complete, but there are still issues, especially with user satisfaction and the cohesive integration of new technology [3]. The introduction of electronic health records can also have a negative effect on patient-doctor communication during clinical encounters in the early stages of installation, according to a qualitative investigation of workarounds associated with the implementation of national electronic health initiatives [4]. Additionally, incorporating artificial intelligence (AI) into the medical industry can aid in better patient and resource management, which could result in better patient outcomes and lower healthcare expenses [5].

Nevertheless, some research has shown that there are always difficulties involved when implementing automatic speech recognition in a medical setting. The caliber of the underlying acoustic models and the training data that were used to create them have a significant impact on the caliber of the data that these systems produce. To put it another way, the effectiveness of the transcribing software is greatly influenced by the doctor's pronunciation, background noise, and occasionally the user's dialect [6]. However, automatic voice recognition can improve the overall efficacy of healthcare delivery and

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assist the ongoing growth of the medical sector by lowering the load of human data entry and increasing the quantity and quality of data recorded into electronic health records [7].

The body of research indicates that although electronic health records (EHRs) hold promise for improving patient care and streamlining clinical documentation, their actualization is still dependent on a number of organizational and technological factors. ASR can be 20% to 60% more time-effective than hand typing, according to the majority of research. More encouraging outcomes for speech recognition in medical settings have also been found in other research cases. For duties carried out by operators of a UAV (ambulance vehicles) control station simulator, the majority of scholarly research discovered that speech recognition cut down on data entering time by about 40% as compared to manual input [8]. This implies that voice recognition might work better in some situations or for some kinds of jobs. Additionally, according to the research evaluation, speech input will be more advantageous when users are working on numerous tasks that are mapped onto several user-response modalities and when speech is utilized in jobs that include brief, highly engaging transactions [9].

According to the body of research on the subject, incorporating automatic speech recognition into electronic health record systems could boost patient care, improve data quality, and further the general development of the medical industry. Automatic speech recognition can be a key component in tackling the issues related to the broad adoption of electronic health records by alleviating the strain of human data entry and enhancing the volume and competence of data entered into these systems.

Methodology: As part of our study, we developed a novel algorithm for electronic health record creation that was intended to reduce the amount of time needed to create patient notes, improve their quality, and increase physician satisfaction with the process. Three healthcare settings were used for the research, which involved on-site modeling, observations, and interviews. Approximately 9000 consultations and treatments are provided by these medical facilities each month. Enabling physicians to create electronic health records in the shortest amount of time and with the fewest possible mistakes was the primary objective. In contrast to conventional typing techniques, our study used a quasi-experimental methodology to evaluate how well ASR technology reduced the amount of time needed for EHR filling. The purpose of this kind of research methodology is to determine whether there is a cause-and-effect link between an independent and dependent element. Our quasi-experimental designs lacked random assignment, in contrast to the actual experimental designs. This is mostly due to the fact that our study only tested the efficacy of ASR in a healthcare context. This suggests that individuals do not merely happen to be assigned to different groups of physicians from different hospitals at random. To allow the observing researcher to track the amount of time spent on each method of note production, the same clinician was requested to manually type on the EHR during the patient interview and then complete the same form using the ASR.

Key Concepts and Propositions: Interfaces that increase user productivity and data accuracy are recommended by Human-Computer Interaction (HCI) concepts. ASR technology functions as a sophisticated interface that can enable more thorough and effective data entry in EHRs, as the literature emphasizes. In addition, the Cognitive burden Theory (CLT) suggests that task performance and accuracy can be improved by lowering cognitive burden. It is predicted that ASR technology would boost the quantity of pertinent medical data entered into EHRs by decreasing the mental strain involved in recording patient information. Furthermore, according to the principle of information quality frameworks, these frameworks offer standards for assessing the correctness, completeness, and relevance of data. By making it simpler for physicians to record

pertinent and in-depth medical information, ASR technology is anticipated to enhance the quality of EHR data.

Variables: The dependent variables in the study were the time required to complete EHR entries, the number of spelling errors, the frequency of copying and pasting, and the number of words per EHR, which indicates the quantity of pertinent medical data. The independent variables in the study were two typing techniques (ASR-enabled vs. traditional keyboard typing). Furthermore, to find additional potential factors influencing medical performance, we assigned control variables like typing ability, health department, EHR system familiarity (trainings), EHR entry type, computer literacy, doctor age and gender, doctors' propensity to copy and paste the current EHR due to their reluctance to type, number of transcription errors in both forms, and other factors.

Data Analysis

The time efficiency of the two typing techniques was compared by statistically analyzing the acquired data. The data was compiled using descriptive statistics, and inferential statistics (such as t-tests) were utilized to ascertain if the ASR-enabled typing and conventional keyboard typing groups' completion times for EHR entries differed significantly.

This methodological explanation guarantees that the study may methodically examine the effect of typing techniques on the time efficiency of EHR documentation by precisely identifying and operationalizing the independent variables.

Results: There is a high association between the type of transcription and the amount of time spent filling out EHRs, as the data analysis above supported the body of previous literature. According to statistical study, doctors who typed by hand took 8.8 minutes to insert each 100 words, whereas those who utilized ASR took only 5.2 minutes to transcribe the same amount of text. When compared to common typing methods, this saves 40.9% of the time. While speaking, users have been able to dictate up to 150 words in a minute, which is up to ten times more time efficient than writing or manual typing, since the literature review noted that users could only type up to 15 words per minute. The total amount of time spent per 100 words was significantly lower, even though they had to spend more time correcting spelling errors and words that the ASR software misinterpreted. According to the experiments, more data can be entered, allowing a medical professional to spend more time with a patient. Additionally, real-time documentation was made possible by the ASR technology, which improved clinical efficiency. Doctors might dictate notes during patient consultations, which would cut down on post-visit paperwork. The continuity of patient care and the timely updating of information were consistently maintained by this real-time documenting approach.

Our experiment's typographical errors resulted in inaccurate patient records, which was another crucial component. Because the ASR system converted spoken language into words, it decreased errors. According to the study, the use of ASR technology reduced documentation errors by 17.6%. The correctness and dependability of patient records were strengthened by this technology. This is mostly due to the fact that over the past ten years, there have been notable advancements in commercial ASR technology that have significantly decreased documentation errors. Current ASR technology and applications have error rates of less than 90%, which suggests that very little time and effort will be needed for editing and corrections. This level of precision is also necessary for upscaling or even healthcare records maintained for patient safety. However, certain elements, such language type, have an impact on ASR accuracy. Compared to other languages like Uzbek and Russian, English has a lot more fever mistakes.

The improved completeness of the data is another encouraging result of our study. Since sluggish typists are no longer a reason to hold back, ASR systems have greatly

increased the completeness of data. Complete dictation by doctors left behind significantly more detailed and instructive patient records. As opposed to manual typing, clinicians did not show reluctance to fill out the EHR, which resulted in a 30.4% increase in the quantity of words in each EHR. According to an analysis of the doctor interviews done during ASR testing, the technology promotes user acceptance and satisfaction. To put it another way, clinical action is already a cognitively demanding endeavor; adding manual entry to this demand makes it cognitively loadable. By enabling them to focus on the patients they were working with and just dictate their notes, ASR might significantly lessen the cognitive load on medical professionals. User happiness and desire to utilize EHRs may rise as a result of this cognitive load decrease.

Overall user experience was positive, according to the majority of doctors; ASR technology could improve overall user experience because it is easy to use and manage. especially when healthcare professionals discovered user-friendly EHR solutions.

One of the major drawbacks of manual typing had been the inability to maintain eye contact and engagement. When they had to type, they were knocked out of the consultation and lost eye contact. To address this issue, ASR allowed the doctors to continue looking the patient in the eye and conversing in the present while taking notes. Patient satisfaction rose as a result of this improved engagement, which also improved the quality of the doctor-patient relationship. But it wasn't until doctors had some experience dealing with the ASR that this phenomena began to manifest.

Healthcare practitioners' propensity to cut and paste preexisting information in electronic health records—more commonly as a result of inadequate typing abilities or a lack of desire to type—was another prevalent issue that ASR greatly reduced. The people involved view this as a perfectly legitimate method of carrying out the act, but in practice, they raise several concerns about patient safety, data integrity, and the general standard of healthcare. 7.5% more doctors said they would not copy and paste current data if they had the chance to dictate medical data to the microphone after working with the ASR and learning about its possibilities.

Conclusion: Voice-to-text-enabled ASRs have increased the chances of EHR adoption and use in healthcare settings, which has improved doctor-patient communication, reduced time waste by two-fifths, eliminated doctors' copy-and-paste tendencies, and increased accurate data entry by 17.6%. However, doctors may only fully benefit from the positive outcomes if appropriate steps are taken in the healthcare setting to enhance system accuracy and integration, privacy, training, and compliance with established standards and other restrictions.

References

1. Rajkomar, A. et al. (2019) "Automatically Charting Symptoms From Patient-Physician Conversations Using Machine Learning," American Medical Association, 179(6),p. 836-836. Available at: https://doi.org/10.1001/jamainternmed.2018.8558.

2. Mandl, D, K., Gottlieb, D. and Mandel, C, J. (2024) "Integration of AI in healthcare requires an interoperable digital data ecosystem," Nature Portfolio, 30(3),p. 631-634. Available at: https://doi.org/10.1038/s41591-023-02783-w.

3. Köse, İ. et al. (2023) "Basic electronic health record (EHR) adoption in **Türkiye is nearly complete but challenges persist," BioMed Central, 23(1). Available at: https://doi.org/10.1186/s12913-023-09859-w.

4. Ser, G., Robertson, A. and Sheikh, A. (2014) "A Qualitative Exploration of Workarounds Related to the Implementation of National Electronic Health Records in Early Adopter Mental Health Hospitals," Public Library of Science, 9(1),p. e77669-e77669. Available at: https://doi.org/10.1371/journal.pone.0077669.

5. Risks and remedies for artificial intelligence in health care (2019). Available at: https://www.brookings.edu/research/risks-and-remedies-for-artificial-intelligence-in-health-care/.
6. Singh, S. (2022) "Impact of Dataset on Acoustic Models for Automatic Speech Recognition," Cornell University. Available at: https://doi.org/10.48550/arxiv.2203.13590.
7. Lysaght, T. et al. (2019) "AI-Assisted Decision-making in Healthcare," Springer Science+Business Media, 11(3),p. 299-314. Available at: https://doi.org/10.1007/s41649-019-00096-0.
8. Draper, M., Calhoun, G L., Ruff, H., Williamson, D T., & Barry, T P. (2003, October 1). Manual Versus Speech Input for Unmanned Aerial Vehicle Control Station Operations. SAGE Publishing, 47(1), 109-113. https://doi.org/10.1177/154193120304700123
9. Islamov, B.A. and Teshayev, R.K. (2023) Paperless Healthcare: As a tool to boost American healthcare and associated challenges, Zenodo. Available at: https://doi.org/10.5281/zenodo.10433186 (Accessed: 20 June 2024).

BANK OMONATLARI ZAMONAVIY SHAROITDA AHOLINING JAMG‘ARMA PULLARINI SAQLASHNING ASOSIY VOSITASI SIFATIDA

Davlyatova Gulnora Muhammedjanovna
Farg‘ona politexnika instituti, “Iqtisodiyot” kafedrasi dotsenti i.f.n.
g.davlyatova@ferpi.uz

Annotatsiya. Hozirgi zamonaviy sharoitlarda bank tizimi har qanday mamlakatning iqtisodiy rivojlanishida muhim ahamiyat kasb etadi. Bank tizimi orqali iqtisodiy subyektlar o‘zlarining moliyaviy ehtiyojlarini qondirib, iqtisodiy faoliyatini davom ettiradi. Aholi mablag‘larini banklarga jalb qilish orqali moliyaviy resurslar to‘planib, ularni iqtisodiy rivojlanishga yo‘naltirish mumkin bo‘ladi. Shundan kelib chiqqan holda ushbu tadqiqotda aholi jamg‘armalar hajmining o‘sishiga ta’sir etuvchi omillar ko‘rib chiqilgan va aholi jamg‘armalarini bank depozitlariga jalb qilishning o‘ziga xos xususiyatlari ko‘rsatilgan. Shuningdek muallif tomonidan zamonaviy usullar yordamida aholining omonat mablag‘larini jalb qilish banklar uchun yangi imkoniyat ekanligi e’tirof etilgan.

Kalit so‘zlar: aholi omonatlari, zamonaviy usullar, raqamli bank xizmatlari, mobil bank ilovalari, onlayn platformalar, moliyaviy texnologiyalar, bank sektori samaradorligi.

Zamonaviy global va raqamli dunyoda banklar kabi moliyaviy tuzilmalarning raqobatdagi muvaffaqiyati ularning qobiliyatlari, imkoniyatlari va o‘z-o‘zini rivojlantirish darajasi bilan tobora ko‘proq belgilanadi. Bugungi kunda bank sohasi kapital bozorlaridagi doimiy o‘zgarishlar bilan bir qatorda eng yetakchi va tez o‘zgaruvchan tarmoqlardan biri bo‘lib, qoida tariqasida, ushbu sohada raqobat ham sezilarli darajada oshib bormoqda. Yangi voqelik va iste’molchilarning talablari moliyaviy tashkilotlarni biznes yuritishning an’anaviy usullaridan voz kechishga majbur qilmoqda. O‘zbekiston moliya sektori allaqachon yangi texnologiyalarning rivojlanishi ta’sirida o‘zgarib borayotgan global moliyaviy muhitga integratsiyalasha boshladi. Bugungi kunda yangi texnologiyalar banklarning barqarorligi, raqobatbardoshligi va barqaror iqtisodiy o‘sishining asosiy omilidir. Shu bilan birga, banklar nafaqat innovatsion iqtisodiyotni rivojlantirishning katalizatoriga aylanadi, balki o‘zlari ham yangilanishi kerak.