Role of Web Applications in Aiding Local Businesses

Integration of Artificial Intelligence into Administrative Healthcare Systems

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By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General Research Problem:

How can technology improve the health of communities?

Technology has long played a role in bolstering the health and success of communities and in the transformation of fields. Before the Internet Age, most businesses were highly if not entirely dependent on patrons coming into their brick-and-mortar store and making purchases in person. Since the rise of the Internet, entire shops have emerged that operate entirely online. The nature of online shops has made it easier for businesses to build themselves up, with reduced costs of having to acquire and maintain a physical building. However, most shops don't run exclusively online or in person, but rather take advantage of the flexibility and wide reach of the Internet to supplement their business operations. The vast majority of restaurants depend on being able to serve patrons in person but with the COVID-19 global pandemic, many businesses were forced to halt in person operations. In response to this obstacle, many restaurants learned to adapt and began depending more on technology to allow them to continue serving customers with online ordering, contactless delivery, and other modifications to their operations to allow them to thrive.

Advancements in technology have also had a transformative effect on the healthcare field, as new technologies have made it easier to obtain data vital to medical decisions and have streamlined processes to reduce the workload on healthcare staff. The digitization of medical records was met with concerns for privacy of patients and the potential for stolen information, but it has ultimately been critical in increasing ease of access and has also significantly reduced cost and space for hospitals. The invention of devices to monitor health data such as pacemakers and other health information trackers has made it easier for doctors to be alerted when an issue arises and has helped prevent many health crises. These kinds of decisions and changes have

allowed for some of the burden previously carried by healthcare workers to be transferred to technology, which has helped slow burnout in the field. When most people think about artificial intelligence in the healthcare field, the mind goes to robots that perform surgery, predictive analytics, or accelerating the development of medicine, but one system that also can and has been improved with AI is healthcare administration. Even before the COVID-19 pandemic, over 40% of physicians reported being burned out, with the top contributor being having to complete too many bureaucratic tasks (Insider Intelligence Health, 2022). This has allowed for the adoption of more artificial intelligence-based healthcare administration tools that can lessen the load on healthcare staff and give them more time to focus on interacting with patients rather than dealing with administrative tasks that could be taken over by technology. In addition to reducing burnout in workers, AI can also be used to make administrative workflows more efficient with the automation of prior authorization and billing processing and can also cut down administrative costs (EviCore Healthcare, 2020).

Role of Web Applications in Aiding Local Businesses

Following the recent global pandemic, many smaller, local restaurants found themselves struggling to stay afloat. During this time, many restaurants found a strong online presence to be a vital outreach for connecting to customers. One way to aid many local restaurants in their efforts to expand their customer base and simultaneously drive more potential business was to create a local restaurant review site. To this end, a web application, Cville Eats, was created to be a centralized site where local restaurants could upload information about their websites, and patrons could leave reviews as well as browse reviews and ratings and explore local businesses. The web application used HTML, CSS, Javascript, and PHP to create a dynamic site hosted on

Google Cloud Platform. The site allowed users to add their restaurant to the site or to add, delete, modify, or search reviews using a variety of parameters. It also featured restaurants based on the highest rating or recent review in addition to a random generator for people interested in trying new cuisines. This application could provide great value to restaurants that may not have a prominent online presence as well as to the local community by bringing together both restaurant owners to collaborate with each other and potential patrons to inform one another. Future work on the project could include expansion by adding a gallery for each restaurant, where customers could add more than one photo, along with separate logins and controls for restaurant owners and customers.

Integration of Artificial Intelligence into Administrative Healthcare Systems

Over the past two decades, artificial intelligence has become more deeply integrated into healthcare services. The rapidly growing array of applications in healthcare includes improving diagnostic accuracy, efficiency in workflow and operations, disease and therapeutic monitoring, and procedure accuracy (Kaul et al, 2020). One of the systems that has benefitted from artificial intelligence is healthcare administration, although some people are unaware of how exactly it is has been integrated and what benefits it provides. Some of the major advantages of AI in healthcare administrative come from the decrease in burden on healthcare workers, the increase in provider productivity, and the reduction of costs. It brings the potential to improve efficiencies of healthcare systems so that healthcare providers are put under less stress and patients are then able to receive better care.

A lot of healthcare workers view AI tools that help automate administrative tasks as a welcome relief because many reported having been overworked and are burnt out from the increased workload that came with the Covid-19 pandemic (Hazarika, 2020). Even before the COVID-19 pandemic, over 40% of physicians reported being burned out, with the top contributor being having to complete too many bureaucratic tasks (Insider Intelligence Health, 2022). Physician burnout has been estimated to have cost the healthcare system around $4.6 billion in the past year and the Association of American Medical Colleges has also predicted that the United States will face a clinician shortage in the coming decade (Insider Intelligence Health, 2022). The high cost of burnout combined with the clinician shortage and increased pressure on the healthcare system caused by the COVID-19 pandemic has pushed providers to combat these issues with AI-based healthcare administration. These AI tools seek to automate administrative tasks that are often repetitive and tedious to allow physicians freedom from these burdens and give them more time to spend in patient care. The increased time available for patient care is highly valued by patients, as a German study found that while most patients reported having a positive view of the use of artificial intelligence in healthcare, if there was a discrepancy between a physician and the AI's assessment, the patients choose to spend on the human physician (Frisch et al, 2022).

Artificial intelligence tools for healthcare administration have extensive potential to optimize administrative workflows and allow healthcare systems to achieve greater operational efficiency. Given the increasing pressure on many hospital systems from increasing costs and clinician shortages, the capabilities of AI tools to automate processes, enhance productivity, and increase administrative efficiency has become an increasingly necessary and important asset. The Brookings Institution found that around 40% of tasks performed by healthcare support staff has

the potential to be automated in areas from hospital admissions to billing and documentation (Muro et al, 2019). A domain that many physicians have highlighted as a priority for automation is prior authorization, which includes tasks such as identifying a patient's health plan, which services or medication require authorization, and collecting documentation for approval. AI tools that can aid in automation include robotic process automation (RPA), which has machine learning capabilities that can automate functions, and natural language processing (NLP), which can understand and process human language to help automate workflow for documentation (EviCore, 2020). In addition, RPA can be used to handle claims and billing with the potential to reduce turnaround time by 85% and eliminate repetitive tasks.

The adaptation of administrative AI tools would also provide economic value and reduce costs in hospitals, and some health care economists believe that reducing administrative costs may be the most feasible way to cut costs in the field. Automation of repetitive tasks with AI such as with claims and prior authorization would lower costs and also result in a better experience for both patients and providers. It would also reduce the intensive and tedious work that must be done by healthcare providers and insurance companies in coding medical treatments, record keeping, estimating medical bills, and checking claims, as well as prevent fraud, waste, and abuse using machine learning.

In my STS research, I will collect more information on the benefits of artificial intelligence in administrative healthcare systems. I would want to learn more about how both physicians and administrative staff feel about these tools, and if they have noticed a change in their workflow or if they think implementing these systems would be helpful. I would like to start by interviewing healthcare providers in the UVA healthcare system to hear about their opinions and experiences. This would allow me to get a sense of what healthcare providers think

about administrative AI tools and see if there are significant effects seen by physicians and administrative staff.

Conclusion

Through my STS research, I hope to learn about how artificial intelligence can be used in healthcare services to reduce burnout in staff and reduce costs for hospitals and create an optimized administrative workflow. I hope my technical research project is able to establish greater bonds and a greater sense of community among Charlottesville citizens and that it is able to use technology to boost businesses by fostering connections. I think this project could provide information on how to use web applications to reach more of the public and what features make new technologies less intimidating and more appealing to smaller communities. These projects can together help improve the health of communities through technology by applying different technologies to make businesses more efficient. Artificial intelligence and web applications both have so much potential to automate tasks and increase productivity in businesses, and the COVID-19 pandemic has shown the need for improvement in both the restaurant industry and the healthcare field. The research into the incorporation of artificial intelligence in administrative systems in the healthcare field could be extended by looking into how patients are also affected by these changes and if their experience has been significantly changed by AI tools in the administrative system. The work on local restaurants in Charlottesville could also be taken further by working with restaurants to offer discounts for certain weeks for specific restaurants to highlight businesses and allow customers a more focused look at local businesses. They could also work in collaboration with the university to give students a discount given the high volume of students who reside in Charlottesville for the majority of the year.

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