Evaluation of University Curriculum in Internship Preparation
(Technical Paper)

Limits of Artificial Intelligence Treatment for Depression and Anxiety
(STS Paper)

A Thesis Prospectus
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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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Prospectus

Introduction

The COVID-19 pandemic has disrupted America's social and economic systems, bringing forth devastating effects to our economy and social lifestyles. The pandemic has taken a toll on many people's mental health. In addition to the economic recession, the restrictions due to the virus creates even more barriers for people who are already suffering from mental illnesses. The number of adults who report symptoms of anxiety and depressive disorder increased from 11% to 41.1% from January-June 2019 to January 2021 (Nirmita, 2021). Constant exposure to stressful situations such as job loss and isolation wears down emotional well-being, causing a spike in depressive and anxiety symptoms in adults in the last two years. The influx in demand for psychiatric treatment has surged since the pandemic, resulting in extensive waitlists which further limits the option pool for care (American Psychological Association, 2020). To meet these demands for psychiatric care, specialists turn to Artificial Intelligence (AI) powered treatment. AI powered telehealth platforms expand access to mental health care while providing intervention to alleviate individuals' depression and anxiety symptoms. With AI technology, doctors encourage patient engagement, expand access to health care, and eliminate care disparities. The STS portion of the paper focuses on how AI can be integrated into psychiatric care for depression and anxiety and the potential benefits and consequences.

The proposed technical report details an internship experience at Amazon. Internships provide students first-hand experience into the workforce and insight on valuable skills in a professional setting (*The importance of internships in college,* 2021). Internships not only hone technical skills, but also encourages character growth in leadership and communication. The

technical portion details the Amazon internship and the skills that are learned on the job. In addition, the paper will discuss how well classes prepare students for these experiences and ways to improve these courses.

Technical:

Statistics show that "43% of college graduates don't have a college-level job in their first job after school" (BBC, 2021). Having a degree is no longer enough to perform well in the job market. With a more competitive job market, "more young people are fleshing out their resumes before they even leave university" (BBC, 2021). Internships provide valuable work experience that help undergraduates secure a job offer. In a survey conducted by National Association of Colleges and Employers, "more than half of graduating seniors who applied for a full-time job (53.2%) received at least one job offer. Within this group, 57.5% of students had an internship and 43.7% of graduating seniors did not have an internship." (Angel & Hurtado, 2021). Internships provide students hands-on-knowledge in their career and refine the expectations about their role.

Internships are vital for software jobs because they showcase an individual's skills. Although the university provides students with a degree and basic knowledge on programming, it does not fully prepare students for real work experience. The technical report will go in depth on how well the University of Virginia prepared a student for her internship at Amazon. The computer science (cs) classes offered at the university expose students to variety of programming languages. However, many required classes in the curriculum focus more on theory and algorithms rather than offering opportunities to work on big scale projects with other programmers. The report will detail the benefits and drawbacks of a strong focus in conceptual

cs topics in the core program. Although the emphasis in academic cs subjects offer students a stronger understanding of fundamental which assist for interview preparations, it is difficult to apply knowledge without stronger appearance of projects.

Additionally, many of the core classes restrict students from working together and emphasize on individual work, which deviates from the essence of a software engineer's development through collaboration. A software engineer's "ability to work well in a team is crucial for personal and professional success" (*Software Development: Why Teamwork is Important*, 2017).

Although the university's program pushes towards education through abstract theories, they offer a variety of elective classes, which exponentiates student growth as software engineers. These classes not only enhance student's technical skills, but also allows development of soft skills such as communication, leadership and time management. The technical portion will delve into suggestions on improving the curriculum and discuss a potential shift in core focus in the program.

A majority of growth a cs student experiences in their technical and people skills is during an internship. During the summer internship at Amazon, a student had to quickly pick up new languages and understand the complexities of their co-worker's code. Asides from technical skills, she also learned how to manage time better, present her work concisely, and interact with teammates. The research will give more insight on the importance of internships and garnering experience prior to the future job search. The paper will detail steps taken to prepare for the internship experience and how the university can better provide that help for their students.

STS Topic:

During the pandemic, “the percentage of adults with symptoms of an anxiety or a depressive disorder during the past 7 days increased significantly from 36.4% to 41.5%. 9.2 to 11.7% of these adults did not receive mental health counseling or therapy” (Centers for Disease Control and Prevention, 2021). The pandemic piles additional stressors to Americans’ lives, increasing depressive and anxiety symptoms. Spiking demand for psychiatric care reveals that America’s current treatment system for mental health is insufficient and cannot meet growing needs for psychiatric care. AI provides access for depression and anxiety treatments.

Although traditional psychiatric treatment effectively remedies anxiety and depression, many people are unable to receive that type of care. Traditional counseling involves arrangement with a therapist in a once or twice a week for a 50-minute session. However, many individuals are unable to make the time commitments. Additionally, the high cost of treatment and stigma dissuade people from getting help (Jodi, 2019). AI powered telehealth applications provide low-cost and convenient alternatives to managing depression and anxiety.

Although AI treatments for depression and anxiety are proven to be effective, there is controversy if AI can effectively diagnose these mental illnesses. Specialists agree that “depression is still not well understood in research and clinical settings” (Canales, 2019). Since professionals are unable to clearly define a diagnosis for depression, AI will also struggle with creating a criterion for diagnosis. An issue that could arise is misdiagnosis. In many cases, “two individuals could also share the same diagnosis with little symptom overlap (Canales, 2019).” Diagnosing mental illnesses is complex and “raises concerns about the validity of saying [individuals] have the same condition. (Canales, 2019)” Furthermore, all patients are different: one treatment plan can alleviate a patient’s symptoms, but for another, it is ineffective.

Professionals go through "trial-and-error basis that can take months [to find] the right treatment for an individual with depression (Canales, 2019)." The question is if AI can develop a complex system for correctly deciphering mental illness and treatment options. Though studies provide high accuracies and reveals the potential of AI in mental health treatment, professionals must consider if it is too early to see the efficacy of these algorithms (Graham, 2019**)**.

The application of AI in medical and mental health fields affects doctor treatments of patients. AI can potentially lead to more problems with the current healthcare system if not harnessed properly. The research will focus on the limitation of AI in psychiatric treatment for depression and anxiety. Since mental illnesses are complex and traditionally rely on patient-to-doctor care, research will analyze the consequences of this integration using technological fix. Technological Fix is "the use of technology to respond to certain types of human social problems that are more traditionally addressed via political, legal, organizational, or other social processes. (Newberry, 2005)." The paper will discuss if these AI telehealth applications causes misuse by professionals and patients to treat depression and anxiety. The quality of psychiatric changes with the introduction of AI technology. Technologies best provide solutions to "specific, well-defined, and stationary problems. (Newberry, 2005)" However, depression and anxiety are not well-defined, which means that AI needs to consider many factors including patient symptoms and behavior.

AI are machines "designed to make decisions" by analyzing "a variety of different sources" (Allen, 2020). AI designed for mental health chatbots use natural language processing (NLP). NLPs use word embeddings to "identify hidden patterns in word co-occurrence statistics of language," which reveals "grammatical and semantic information. (Caliskan, 2021)" An

improper dataset propagates strong bias towards certain social groups, widening pre-existing health inequalities. Many research articles fail to address potential biases with respect to religion, race, gender, nationality, sexuality, and age. (Simon, 2021**).**

Solely relying on AI could "create new problems as they solve old ones" (Newberry, 2005). However, a criticism with the technological fix is that "social fixes also have unforeseen and deleterious side effects. (Weinberg, 1978)." Social and technological fixes can never free our society of its problems, but "small incremental improvements, taken as a whole, will lead to happier, more fulfilled people." (Weinberg, 1978) It's important to note that technological fixes are not the only type of band-aid solution and society's view on mental disorders also impact the views on psychological disorders as well. The addition of AI in psychiatric care improves the quality, reduce stigma towards, remedy scarcity of treatment and gradually better overall mental health services in America.

Research Section and Methods

The research will center around one main question: How can Artificial Intelligence be best implemented for psychiatric treatment and what are the consequences we should consider?

The research question focuses on the effectiveness of the psychiatric treatment for depression and anxiety with Artificial Intelligence. Case studies will be used to examine the effectiveness and outcomes of Artificial Intelligence telehealth platforms. The cases will review AI platforms such as Youper, Woebot, and Wysa. The sources will detail the efficacy and retention of the treatment. These studies explain certain machine learning and therapy techniques used in each application. The experiments provide further insight on how these applications are used and the draw backs in their research (Fitzpatrick1, 2017). Additionally, studies will be

analyzed on biases of natural language processors and biases within machine learning. These studies will provide insight on possible consequences AI could have on the current mental health treatments and how to mitigate these effects.

Conclusion:

The goal of this paper is to investigate how Artificial Intelligence can be implemented into psychiatric care for depression and anxiety. The research focuses on the potential consequences that this new technology has on the current system and groups of people. To fully explore these topics, I will be using several secondary case studies on the use of Artificial Intelligence platforms for depression and anxiety. The outcome of this research is to gain a more robust understanding of the implications and benefits of Artificial Intelligence in mental health care. By understanding both the benefits and limitations of these technologies, psychiatrist and specialists could gain insight on how to implement these new technologies to our current health system.

The technical essay explains my internship experience at Amazon. It details the types of skills and experiences one gains in a professional setting. Furthermore, the paper will provide insight on how classes could be transformed to further prepare students for their career field experiences outside of school.

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