

Undergraduate Thesis Prospectus

## Integrated Entertainment: Improving Video Streaming

(technical research project in Computer Science)

## Life in the Hole: How the U.S. Deals with Solitary Confinement

(sociotechnical research project)

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 does the human need for sensory stimulation manifest itself?*

The human brain is complex and mysterious; we learn more every day, yet we still can't comprehend how and why it reacts the way it does. One thing we do know is that the brain feeds off of stimulation; the brain takes stimulation as input and processes it to perceive its surroundings. As technology grows exponentially, so too does the number of digital screens and thus the amount of stimulation our brains receive. On average, we spend 4 hours a day looking at our smartphone (Matei, 2019). This statistic doesn't account for the time we spend looking at our computer, tablet, or TV; which has increased during COVID-19 quarantine and brought other problems with it (Wong et al., 2020). This demonstrates how humans crave and actively seek out stimulation, but what happens when the brain is deprived of this needed titillation? Studies have shown that sudden deprivation leads to memory loss, lower IQ, hallucinations, and personality changes (Doman, 2018). Balancing modern over-stimulation with the hunger from the deprived can cause dissonance and manifests itself in different ways.

## **Integrated Entertainment: Improving Video Streaming**

*How can quality of service and efficiency be improved for video streaming?*

With the continued proliferation of streaming, TV has become scattered across many services competing for the viewers' attention. In the days of cable tv, there were helpful guides to scroll through where you could see what was playing on each channel. With streaming subscriptions surpassing cable packages, when deciding what to watch viewers often find themselves wandering through multiple different apps for different streaming platforms (Miller, 2019). As a result, it is not unusual to forget where the content you are looking for lives.

In this project I will build an Xbox app that acts as a one-stop-shop for all streaming services. My technical advisors are Miaomiao Zhang and Worthy Martin of the Computer Science Department; I'm collaborating with Bendert Stansell to complete this capstone project. To use my app, you enter the title of the content you want to watch and it returns the platform(s) that the content is on (ex. Netflix, Amazon, Hulu). Furthermore, my app customizes the user experience by utilizing Machine Learning to recommend shows. Improved user experience benefits the stream providers as well; with better performance and lower frustration subscriptions are likely to climb.

This project aims to enhance the individual streaming experience by increasing efficiency and personalization. Having a central location will save users the non-trivial time it takes to type and search for a title across many different platforms. Using machine learning to personalize the content will encourage the user to watch programs they enjoy which they may not have found or searched for independently. A centralized platform coupled with customized recommendations will achieve the goal of enhancing the overall experience by making it easier, efficient, and tailored.

Right now, the market has products such as the Amazon Firestick and Apple TV which provide a similar service as my app. They provide a central "hub" of different apps, but they lack integration. The problem is there's no similar product on the Xbox platform. Currently on Xbox you have to visit a streaming app, type in a title, see if it's there and then repeat this process for each provider. Additionally, the typing interface on Xbox is inefficient; you have to use an analog stick to find each letter, which can compound to minutes or even hours over many iterations.

The successful implementation of my project will incorporate many computer science methods and techniques. To contact individual stream providers, I will use an Application Programming Interface (API). This will allow me to query each provider and see if they host the specific content. In order to recommend shows for users I will aggregate a lot of data and develop a good machine learning model. Preliminary data will be sourced from Kaggle, which contains a dataset of 45,000+ movies and TV shows with title, cast, ratings, genre, and keywords. This will suffice for general predictions, but once the customer has used my app, I will apply their specific data to personalize recommendations further. As for the model, I will use a neural network. This decision is based off of Netflix's competition where the winners employed an ensemble model (Chen, 2011). Ensemble models use multiple decisions from smaller models, instead of a single decision from a larger one. Neural networks expound upon this idea and add more layers, which is why I chose to use this method. I'll utilize GitHub in order to collaborate with my partner and we will write our code in Python. Before releasing this software, I will train my model to test its accuracy as well as make sure my API calls are fault resistant.

The end product will be an Xbox app that streamlines video searching, providing the user with an easier and customized experience. This will be a relief to users, but the stream providers will also benefit. Increased customer satisfaction added with extra time to watch shows instead of searching will drive subscription and retention rates up. Better quality of service and increased subscription rates may open the door for potential partnerships with the providers.

### **Life in the Hole: How the U.S. Deals with Solitary Confinement**

*In the U.S, since 2000, how have critics and defenders of solitary confinement advanced their respective agendas?*

The U.S. currently holds 2,094,000 of a total 10,350,000 inmates, amounting to over 20% of prisoners worldwide (World Prison Brief, 2020). The total population of the U.S. is 328,239,523, which represents 4.25% of the global population (U.S. Census, 2019). These disproportionate statistics highlight the continually expanding prison system in the U.S. Solitary confinement is an internal conflict, which has come under particular scrutiny since the 21<sup>st</sup> century. Prison guards use administrative segregation as a corrective punishment; proponents say it's effective and must be done. Opponents find themselves asking many questions, two of which are *"Is it ethical?"* and *"Is it used appropriately?"*. The struggle between these two sides leaves the U.S. divided while prisoners are left to bear the burden.

O'Keefe et al. (2011), a forensic and clinical psychologist, performed a study on inmates with and without predispositions and found that administrative segregation can manifest mental health issues. A team of psychologists from the University of Montreal (Luigi et al., 2020) studied the lasting effects of solitary confinement and found high mortality rates, especially by suicide. Algamal (2020) performed a study on mice which demonstrated how "unpredictable stress and chronic social isolation" lead to PTSD. Alexander et al. (2010) and his team at Simon Fraser University performed a study with rats which showed that isolation increased drug use. This has alarming effects for prisoners released after enduring solitary confinement. Finally, Chadwick (2018) conducted a longitudinal study of male inmates showing that solitary confinement caused higher levels of anxiety and depression; a more insightful conclusion was that administrative segregation was a barrier to opportunities for psychological growth, demonstrating how prison incarcerates the body and mind. The minimal human interaction that comes from solitary

confinement causes social isolation and leads to serious cases of depression, PTSD, schizophrenia, agoraphobia, and many other mental illnesses in prisoners who may not have a predisposition. This is because the brain is equipped to handle an abundance of stimuli which release hormones and illicit regular emotions and thoughts. Therefore, when the stimulus is low it leads to a chemical imbalance because the regulatory hormones aren't being released. Neurotic holding patterns in the brain make these changes hard to overcome and, in most cases, permanent, even after a prisoner is released from solitary confinement.

Shavez Holden, who is serving 20-40 years for 3<sup>rd</sup> degree murder, detailed his experience and the corruption surrounding solitary confinement through a website called "Prison Writers." He examined the abuse of power, remarking: "You really don't have to do anything," to get sent to "the hole" (Shavez, 2020). Frank De Palma spent 22 out of his 42-year sentence in solitary confinement and developed severe agoraphobia, which adversely affected his ability to assimilate to the outside world. De Palma spent the first 10 months in the psych ward to stabilize with civilian life. De Palma wrote: "I wear a smile on my face, but there's a war going on inside," showing that people aren't the same after solitary confinement, even if they act it (De Palma, 2019). Danny Murillo, a Latino man from Los Angeles, was arrested at 16 for armed robbery and spent 7 of his 14-year sentence in solitary confinement. He was sent to solitary for having a calendar with pictures of Aztec and Mayan drawings, which guards wrongfully associated with gangs. This illustrates the unfortunate truth of racial bias in the prison system, "[Solitary] is there to dehumanize you, to break you physically, mentally, and spiritually" (McCray, 2015). The American Civil Liberties Union (ACLU) have a campaign to stop solitary confinement, claiming, "Long-term isolation costs too much, does nothing to rehabilitate prisoners, and exacerbates mental illness" (ACLU, 2020). An anonymous prison guard gave his

perspective in an interview. He provided examples of actions that could warrant solitary (ex. Stealing, fighting, etc.); described his experience feeding and showering inmates; and remembered the, “cold and hollow” feeling of being in “the hole” (Stahl, 2017). President Obama knew the harsh effects of solitary confinement and opened an investigation into the use of “restrictive housing,” in 2015. He adopted the recommendations found from the investigation, mandating that all prisons must document a specific reason for punishment, train staff regularly, review inmate placement regularly, and develop a plan to return the inmate (Office of the Press Secretary, 2016).

There are multiple sides to this story, from the prisoners themselves and activist groups against solitary confinement to the warden and guards who run the prison all the way to the President of the United States. Each group advance their respective agendas differently. The prisoners tell their first-hand stories, activist groups protest and lobby, guards advise the importance and effectiveness, while the government examines the system and listens to the people. According to Davis (2003), the rapid growth of the U.S. prison system is attributable to a “prison-industrial complex,” which demands ever more prisoners. This means that an increasing number of prisoners will face the effects of solitary confinement before the battle over the punishment is settled. Studies have shown that a severe lack of stimulation to the brain, such as in solitary confinement, leads to biological changes that are most often permanent. Along with the chemical imbalances, social isolation constrains intellectual growth which leads to compounding disadvantages.

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