New Mexico Supercomputing Challenge Final Report:

Using Technology to Aid Those Struggling With PTSD

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Executive Summary:

Stress plays an important factor in our everyday lives and affects some individuals more than others. While some individuals face minor effects such as a lack of sleep, others experience more severe effects including mental illnesses such as depression, anxiety, and PTSD. Ultimately, the presence of high levels of stress may negatively affect the life of each individual.

Prompted by this common yet perilous occurrence, our goal was to develop a program that models the stress that an individual faces and how it affects their life, particularly their sleep schedule, which can lead to multiple health problems as previously mentioned. Decreased amounts of sleep are a potential effect of elevated stress levels and we wanted to observe the ways in which a lack of sleep can further affect an individual's health, increased stress and their lifestyle in its entirety.

Through the creation of this model we plan for it to be used by individuals that deal with high levels of stress daily, particularly those who experience PTSD. The use of the model can help them better understand what they are experiencing and see what aspects of their life they can change in order to live a healthier and happier life.

Problem:

According to the U.S Department of Veterans Affairs, 71% to 96% of people with PTSD often have nightmares. Additionally, individuals that suffer from these traumatic episodes often endure them alone, which can be a major contributor to the development of other mental health problems including depression and anxiety. Our goal is to bring awareness to individuals about the development of their mental health issues as well as provide recommendations on how to prevent stress that could potentially lead to PTSD.

Solution:

To solve our problem we did research on the effects that stress has on a person's sleep schedule. We analyzed how several stressors can affect the way a person sleeps and how that lack of sleep can affect their life in multiple ways by making them more susceptible to mental illness such as depression. With the information we gathered we began our testing by creating a model inside of NetLego. This model would simulate how people experiencing large amounts of stress would sleep less depending on how much stress they were experiencing. We used four stressors (put them here), because these four aspects are the most common stressors present in everyday life. Then based upon these stressors the average sleep of the individual decreases.

How did we validate the model?

We validated the model by comparing the results to evidence located in our research, which shows that stress creates an impact on sleep quality and duration. According to webmd.com, 7 to 9 hours of sleep are required in order to ease stress. Our model would represent how stress would affect the individuals sleep depending upon how much stress they are dealing with based upon our research.

Results:

The results that the model presented were quite accurate with what the research showed. The model simulated a batch of people who were all diagnosed with PTSD and how much sleep they would be able to achieve throughout the night according to the amount of stress that is part of their lives. The model itself simulates through colors how much a person is affected and how they'd react through a night's sleep. Results showed that the more stress that is piled onto someone, the higher chance there would be that they wake up at the dead of night and make it genuinely difficult, if not impossible, to go back to sleep once again. That all changed once the addition of a theoretical application that soothes those who have been awakened by nightmares caused by their PTSD was activated. This changed things significantly since after that, people were able to achieve a full night of sleep much like the rest of the people living a healthier, stress-free life.

Conclusion:

The conclusion we hoped to achieve was to help individuals that suffer from PTSD better understand themselves and their situation in order to help limit the stress that comes into their lives. Since individuals with PTSD often have nightmares our team did research on mental health and PTSD to help us better understand and create a solution they can turn to. With this in mind, our team created a simulation on a program known as "NetLogo" to create a model of different types of sleep problems which can arise at night. The simulation showed how people with more problems tend to sleep less than people which have none at all, with this information we came to the conclusion that we could help individuals better understand themselves by having them log their nightmares and seeking help if the problem worsened.

Significant Achievement:

Creating a simulation which shows how people which are diagnosed with PTSD go through a night of sleep. The simulation shows around 20 individuals, all which have different amounts of sleep. The individuals are presented with 4 types of problems/situations all which cause stress, these problems being alcoholism, less sleep, family issues, and drug abuse. With every problem an individual receives the color which they have already will change to a different one with numbers signifying how much sleep they got in order to differentiate them from the rest. The colors showing the different variants are blue (no sleep problem) , green(1 problem), yellow (2 problems), and red(all problems) all which signify the amount of sleep they received.

Software and References:

Software:

2021. NetLogo. Uri Wilensky.

References:

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