Undergraduate Thesis Prospectus

Chess Engines: How to Make Chess Accessible to the General Public

(technical research project in Computer Science)

Game of Phones: How Social Media Companies, Parents, and Others Are

Competing Over Children's Social Development

(sociotechnical research project)

by

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General Research Problem

How are children affected by the modern internet?

Online media offer parents, teachers, and caregivers new means of educating and entertaining children (Nemec, 2011). Such media can also divert children from opportunities to develop direct interpersonal relationships, to enjoy active play, and to pursue games or creative activities that contribute to their growth in other ways (White-Gosselin, 2022).

Chess Engines: How to Make Chess Accessible to the General Public

How can chess be made more accessible?

My advisors are Rosanne Vrugtman and Briana Morrison who are both in the CS Department, and my project is an independent project on which I am working alone.

Chess has vast impacts on the cognitive capacity of people of all ages, but especially in children. Experts, such as Oberoi (2022), have found that chess has great benefits in executive functioning among children ages 8-17, meaning that the ability to craft paths to attain goals improved in the children tested. Others (Gao et. al., 2021) have concluded that chess skill "might be a reliable proxy measure of student academic achievement." Given these impacts, it is important to consider how we might augment the ability of children to engage with this ancient game.

I am building a chess engine with a visual interface. Most modern applications in this field are either pay-to-play or difficult to get running for someone with no technical background. As of writing there is one popular state-of-the-art chess engine called Stockfish (2022). It is a highly customizable, open source chess engine which has a standardized chess engine interface (called UCI) and runs in the command line. On a basic level, it uses a tree searching algorithm

and an evaluation function to return the best move to the user. This is insufficient due to the general lack of technical prowess of the average person. Without an associated user interface, a child would need to understand the use of the command line and be a fairly technically proficient to run the best software.

The tools used to solve this research problem include ReactJS, which is built for creating interactive websites, but here is used for making a local user interface in a web browser. I also use the Spring framework for Java for the backend part of the software, which houses all of the logic. Using these two pieces of software, I have been able to effectively connect the less efficient, but more visually useful Javascript, with the more generally useful Java for the more computationally expensive parts of the system.

By the end of this project, I aim to have a moderately leveled, playable chess engine for people to interact with through a browser-based UI. This could be a great step in opening up chess to the next generation which could have positive effects on the future of our society.

Game of Phones: How Social Media Companies, Parents, and Others Are Competing Over Children's Social Development

How are social groups competing to influence children's online media exposure?

How do social media companies seek to profit from the eyes of children and how do parents respond to efforts to collect and monetize data from their children? Over the past ten years, the time children spend online has risen (Twenge, 2018). Many have been given almost unlimited access to internet connected devices, but what kind of impact can that have on the way they interact with their peers? Children need space to develop at a pace set by their parents and guardians, but does access to social media impede their development?

Social media companies serve ads to users on behalf of their advertisers. They are aware, though, of their impacts on children of all ages, but specifically teens, and have rolled out many features designed to protect teens (Mosseri, 2021). Parents, who desire to see their children flourish, have found it significantly harder to raise their children in the internet age (Auxier et al., 2020). Child psychologists, who act as analysts on behalf of parents, have found that children who use social media excessively are more likely to show signs of psychological disorders (American Psychological Association, 2011). Because social media exists to serve ads, we must also look at advertisers who want to sell their products, some of which have recently started to slow advertising to children (Hills, 2022).

The advertisers and the social media companies form a bloc, driven by the prospect of profiting from monetizing child viewership. They act in opposition to the bloc comprised of parents and child psychologists, whose main agendas are to maintain the well being of children. These two blocs are not in competition because of opposing philosophies, but because of side effects of social media's existence.

Researchers in the United States have found that decreases in psychological well-being among teens can be linked to the rise of social media and usage of smartphones (Twenge, 2018). On the other hand, a meta-analysis found that there was little impact that social media use had on suicidal ideation (Ferguson, 2022). Yet other research in the Netherlands found adolescent social media use had impacts on friendship closeness mostly on a person-specific basis (Pouwels, 2021).

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