Final Project Proposal
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Period 3
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1. Title (or subject area) of the project
    The Implementation of Artificial Intelligence and Machine Learning in a Computerized Chess Program.

2. Purpose and scope of the research project
    The purpose is to see whether or not an AI chess player can improve it's play as it plays more and more games of chess. The scope of the project will include writing a basic program that can keep track of a game of chess, writing an AI player for this game, and then implementing machine learning techniques to get the AI player to improve with time. The machine learning will probably be the hardest part as it will require a lot of research and complicated algorithms.

3. Background and review of current literature/research in this area.
    I started by doing basic background research on chess, computer chess, artificial intelligence and machine learning. I was referred to a paper written by Claude Shannon in 1950 entitled "Programming a Computer for Playing Chess" which talks about game theory, chess, and programming a computer that is decent at playing chess. I have been spending most of my research time reading over this paper. I also recently found a different paper called "Temporal difference learning for heuristic search and game playing" by D.F. Beal and M.C. Smith in which the researchers discuss their research of Temporal difference learning (a type of machine learning) in the context of chess and shogi (Japanese chess). C. Hayes ('05), Nicholas Sidawy ('07), Harry Beddo ('07), Logan Kearsley ('07), Josiah Boning ('08), and Michael Yura ('08) all wrote computer systems research papers related to machine learning and/or artificial intelligence.

4. Procedure and Methodology.
    Python will be used to code this project. The program will remain text-based for simplicity and memory purposes. The program will be written in 3 major stages. Stage 1 will simply allow two humans to play each other in a fully-functional game of chess by entering moves into the command terminal. Stage 2 will allow a human to play against an AI player. This stage will probably be written in a few substages, starting with a simple endgame scenario and working up to a full game of chess. Stage 3 (the most difficult stage) will incorporate a machine learning element, meaning that the AI player gets better after every game. To test this stage, two AI players will play against each other numerous times, recording wins and losses. One of the AI players will be able to machine learn while the other player will maintain the same level of play, meaning that the machine learner should theoretically win more and more games than the normal AI player as time goes on.

5. Expected Results & Value to Others
    If I am able to appropriately program a functional machine learning

component to this project, then the results should show that the AI player with machine learning ended up having a significantly better win percentage than the AI player without machine learning after a large series of games. These results can be presented as a graph of the machine learner's win percentage vs time, showing a positive trend line. All the visuals of the program will be text-based representations of the chessboard (for speed and simplicity purposes) with the user inputting their next move into the command prompt. It is quite possible that the machine learner's moves will take a while to execute because of memory/processing limitations of the computer, however if I code everything well, the program should run pretty smoothly, especially if there are no real graphics.