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Capstone Project 1 Proposal

League of Legends Item Balancing

**Game Description (domain knowledge?):**

League of Legends is a Multiplayer Online Battle Arena (MOBA) game. It is a game played by pitting two five-player teams of champions (the in-game characters) against each other in a race to destroy each team’s primary building: the nexus. Each nexus is protected by two towers directly in front of it and three lanes of three additional towers and one other building (called the inhibitor) each. The three lanes (known as top, middle, and bottom lane) from each base connect together to form the map. The area between the lanes is known as the jungle, and contains neutral (not on either team) monsters.

Throughout the game, players earn gold in several ways: passively over time, through killing lane minions, jungle monsters, and champions, or destroying neutral objectives, like towers and dragons. Gold is used to purchase items to give the player’s champion various stat boosts and abilities. Items form one of the pillars of League of Legends gameplay; understanding which items are useful on which champions is a constantly changing topic as champions and items get tweaked on a weekly basis.

**Problem:**

What items need to be changed in the game? The primary reasons for change that will be investigated here are items being too weak or too strong (defining this is a big part of the project). Statistically, champions should have roughly a 50% win rate with normal items, if both are balanced correctly and the match is fair. Finding items that champions get unusually high or low win rates with is the goal.

**Client & Motivation:**

The client is Riot Games, the studio who created and maintains League of Legends. They have a strong incentive to keep their game as fair as possible. Fairness in champions and items fosters diversity in which of these are picked in games, and this is where the game is supposed to shine. A lack of diversity can make the game feel stale, and cause players to stop playing and spending money on the game. One of the main focuses for fairness / balance is in the items players can pick to use on their champions. Making sure items are balanced is probably an ongoing task at Riot Games.

**Data:**

The data I plan to use will fall into a few categories.

Information about the items themselves - item bonuses and costs - may have to be collected by hand, but this is a doable task.

Match-level data - which items are bought and when, by which champions - can be aggregated from the [Riot Games API](https://developer.riotgames.com/). Another main factor to track is the win/loss. This determines the win rate.

I will also probably need to manually tag all items and champions into categories (“assassin”, “mage”, “adc”, “fighter”, “tank”) to match champions to items that they would regularly build, to help filter out nonsense item builds (which would skew into losses more often, and give their opponents wins more often).

**Approach:**

The initial approach will be a pure statistical analysis. I will establish pick rates of items, the regular set of champions that pick them, and win rates when the items are picked, and to try to make a cost effectiveness graphic to interpret the bonuses vs cost of items. From there, the easier problem is identify unpopular items, or items that have low pick / win rates, lower cost effectiveness, and/or a smaller set of champions that regularly build it..

After, I can try to flip the problem and find extremely popular items, with high pick and win rates across a large champion pool. I am considering some machine learning models like random forests to see how unlikely win rates are to be, say, +/- 5% from 50%.

**Deliverables:**

I plan to produce code, a short paper, and a slide deck for this analysis.