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Final Report: NBA Player Effectiveness Visualizer

The *NBA Player Effectiveness Visualizer* was solo-developed in C++ and designed to capture and display a basketball player's shooting performance using simple text-based charts. My motivation behind this project stemmed from my passion for basketball (the playoffs have been exciting this year) and a desire to apply C++ concepts to a real-world data visualization task. Over the course of about two and a half weeks, I have worked on designing and building this application that accepts player statistics and outputs a visual representation of those stats using ASCII characters.

In the spirit of the assignment, the project was structured for modularity and extensibility, allowing for future improvements to be made as I get better at coding and delve deeper into statistics and analytics. I hope to improve it someday with such better graphics libraries or data analytics features.

The program starts by prompting the user to input a player's name, position, field goal percentage, and three-point percentage. After this, it then validates the percentage values to ensure they are between 0 and 100, minimizing the risk of an invalid input breaking the logic or causing display errors.

Once the data is entered, the program uses a class called "player" to take in the input and provide methods to display both a text summary and a simple effectiveness chart. These charts are constructed using ASCII bars (= characters), giving a quick, visual way to interpret the player's shooting performance.

Furthermore, the user is prompted with the option to save this data to a text file (`nba_players.txt`) for future reference. This feature is useful for tracking multiple players across different games, spans, or seasons. The file output is handled via standard C++ file streams and written in a comma-separated format for potential future use in a spreadsheet for example.

Some Key C++ concepts I utilized in the program include:

- **Classes and Inheritance** for structuring player data.
- **Streams** for file input and output.
- **Input Validation** to handle common user entry errors.
- **Modular Design** using functions and reusable methods.

One of the biggest initial challenges I faced was output formatting, specifically with aligning and sizing the ASCII bar charts to reflect percentages accurately without breaking the visual alignment. This was resolved when I figured out (kind of obviously) that I could scale the percentage values and format them using `fixed` and `setprecision`.

File saving was implemented using `ofstream` with append mode, which required me to ensure the file was correctly opened and closed without overwriting previous entries.

This project helped reinforce the importance of clean code organization through object-oriented design. By using a dedicated `Player` class, I was able to get all relevant behavior and data in one place and this ultimately made it easier to extend or modify the functionality later on.

Through this, I also gained a deeper understanding of basic file handling in C++, and how to design more user-friendly programs that can be built upon for future development. The visual component of the ASCII bar charts, though simple, provided solid insight into how effective simple visuals can be for data interpretation.

While the current version is fully functional as a console application, there is potential for several upgrades. For instance, integrating the SFML (Simple and Fast Multimedia Library) would allow for a better graphed representation of stats using bar charts or pie graphs. I could also implement the use of an online API in the future so that stats don't have to be inputted but could instead be pulled from the API and displayed, this is all food for thought if I ever revisit this project. Exporting data in more flexible formats like CSV or JSON is also a planned improvement of mine which would allow users to import the stats into spreadsheet tools or web dashboards.

Overall as a whole, this project was enjoyable and rewarding and really allowed me to apply the C++ concepts we learned this semester in a practical way. I really like this project and value it over my last one because it feels more personally inspired and I think it is a good showcase of where I am as a freshman level coder. I hope this project can land me an internship or something in the future if I continue to improve on it, who knows.

The full code and documentation for this project can be found at:

 <https://github.com/schizoschizo/nba-stat-visualizer>