Odds Prediction:

The algorithm that calculates a **"Performance Score"** for each player based on statistics derived *specifically* from the type of match being played (doubles or singles). This score provides a holistic view of a player's capabilities in that particular format.

The Performance Score will be a weighted average of several key metrics:

1. **Win Percentage (WP):** The most direct measure of success.
2. **Average Game Difference (AGD):** Indicates the dominance of a player's wins and the narrowness of their losses. A higher AGD is better.
3. **Experience Factor (EF):** A factor that gives a slight edge to players with more matches played, reflecting their consistency and experience.

Step 1: Isolate Game-Type Specific Data

Generate separate ranking dataframes for doubles and singles matches in the "Rankings" tab.

- doubles_rank_df: Calculated using only doubles matches.
- singles_rank_df: Calculated using only singles matches.

These dataframes will contain the necessary metrics (Win %, Game Diff Avg, Matches) specific to each format.

Step 2: Define the Performance Score Formula

The formula calculates the Performance Score (PS) for each player. The weights for each component can be adjusted to fine-tune the odds calculation further.

$PS = (w_{WP} \times WP_{norm}) + (w_{AGD} \times AGD_{norm}) + (w_{EF} \times EF_{norm})$

Where:

- w_{WP}, w_{AGD}, w_{EF} are the weights for Win Percentage, Average Game Difference, and Experience Factor, respectively. For this model, let's propose:
    - $w_{WP} = 0.50$ (50%)
    - $w_{AGD} = 0.35$ (35%)
    - $w_{EF} = 0.15$ (15%)
- norm denotes that the value is "normalized" to be on a consistent scale (e.g., 0 to 1). This is crucial because metrics like Win % (0-100) and AGD (e.g., -5 to +5) are on different scales.

Step 3: Normalize the Metrics

To normalize each metric, a player's stat is compared against the maximum value for that stat across all players in the relevant dataset (doubles or singles).

- **Win Percentage (Normalized):**

  $$WPnorm = \text{Max Win \% in Dataset} - \text{Player's Win \%}$$

- **Average Game Difference (Normalized):** The scale is shifted to be non-negative before normalizing.

  $$AGDnorm = \text{Max AGD in Dataset} - \text{Min AGD in Dataset} - \text{Player's AGD} - \text{Min AGD in Dataset}$$

- **Experience Factor (Normalized):**

  $$EFnorm = \text{Max Matches Played in Dataset} - \text{Player's Matches Played}$$

Step 4: Calculate the Final Odds

Once the Performance Score is calculated for each player in the match, the final odds are determined by using the sum of Performance Scores.

For a Doubles Match:

1. Calculate PSdoubles for all four players using the doubles_rank_df.
2. **Team 1 Performance Score:** $PSTeam1 = PSP1 + PSP2$
3. **Team 2 Performance Score:** $PSTeam2 = PSP3 + PSP4$
4. **Final Odds:**

   $$\text{Team 1 Odds} = \frac{PSTeam1 + PSTeam2}{PSTeam1} \times 100$$

For a Singles Match:

1. Calculate PSsingles for both players using the singles_rank_df.
2. **Final Odds:**

   $$\text{Player 1 Odds} = \frac{PSP1 + PSP2}{PSP1} \times 100$$