# Personalised player advice system for badminton - Nockout

## Background

One of the future enhancement's that Nockout is seeking to add is to provide tailored advice to players based on video recordings. With this in mind, I was tasked to lay the groundwork by simulating data and analytics pipelines. These pipleines will serve as a foundation, upon which computer vision models can be integrated.

## Step 1: Simulating Game Data

- To simulate data that would be retrieved from a computer vision model, we used the official implementation of **Coach AI Badminton Project** from Advanced Database System Laboratory, National Yang Ming Chiao Tung University.

- In this implementation, they designed a safe and reproducible reinforcement learning based badmintion simulation environment. This environment allows us to simulate badminton games and observe it in a coordinate system. By simulating a game, we produced realistic datasets for a badminton game that included the location of the players and the ball, the shot type, reason for loss etc.

## Step 2: Understanding the data

- Unfortunately the documentation was lacking explanations about the data that was produced. Therefore several inferences were made by plotting and visualising the data.

- For example, the bounding box representing the badminton court was estimated using the player and ball locations.

- The Ball type was mapped from chinese to english translations

## Step 3: Analytics Pipeline

- These pipelines are designed to process match data and provide users with insightful metrics/ statistics about the match. Here are some of the key analytics we focused on:
  - **Game Flow:** To highlight the game flow, we provide a plot of the rally lengths



Length of Rally Plot
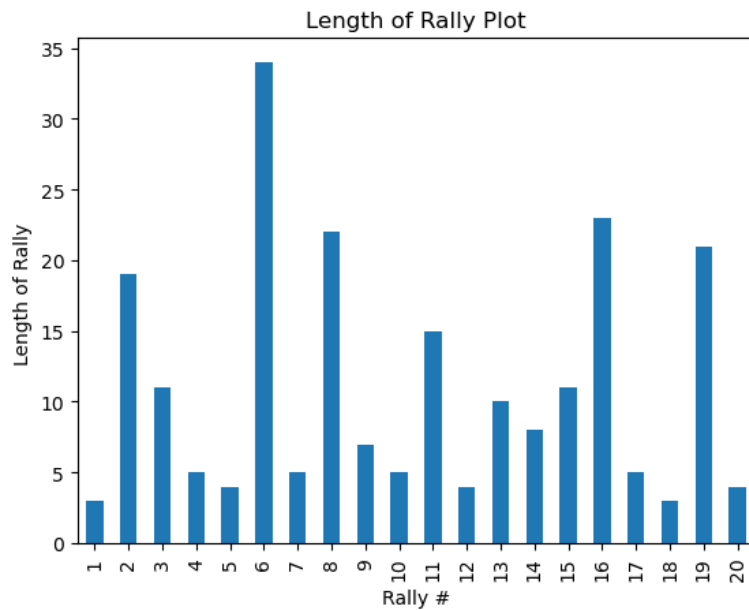
  - **Player Movement:**
    - We display the distance covered by each player and plot the position of each player at the beginning of every rally
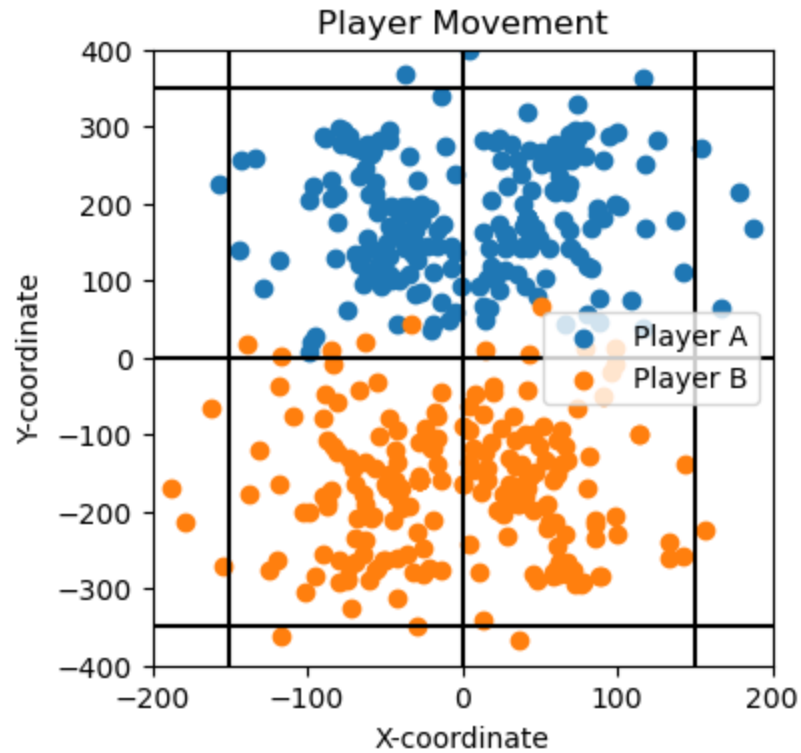
Player Movement

- **Shot type distribution:**
  - We present the shot type distribution for all shot types played by the user. This helps players understand their shot type patterns and identify areas of improvement.

Distribution of Shot type
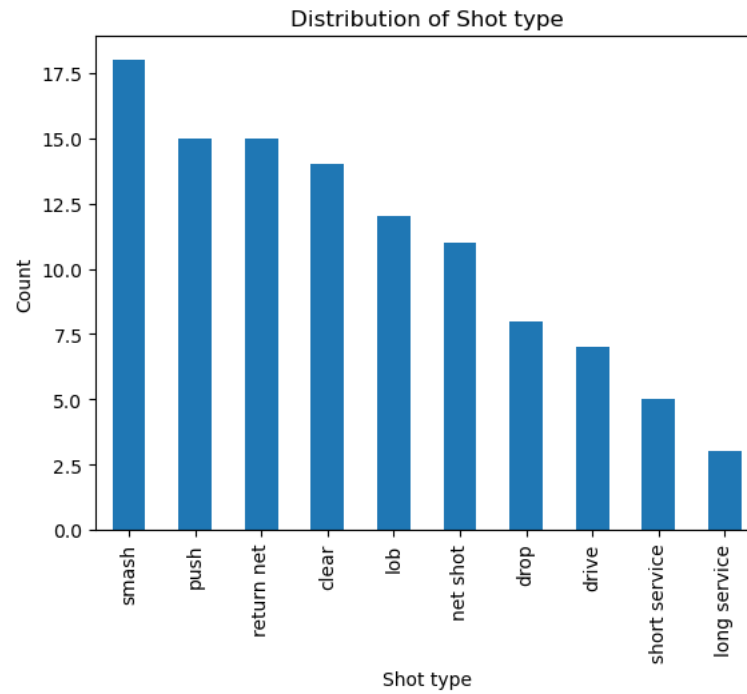
- We then present the distribution of shot types that lead to a winning point of the user. This allows them to identify which shot type was most effective for them to secure points.



Distribution of your winning Shot
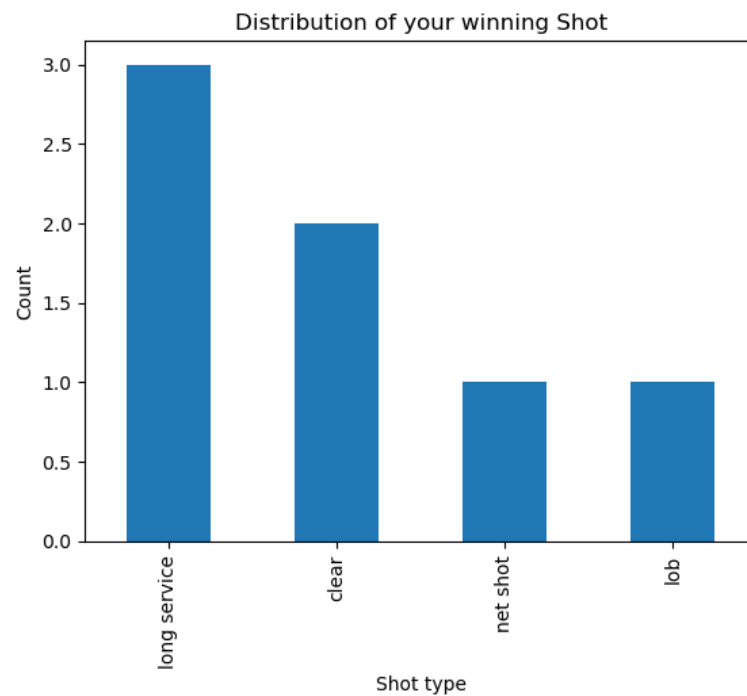
- We also present the distribution of shot types that the opponent used to win a point. This allows the user to identify which shot types they have to learn to defend better and practice against.
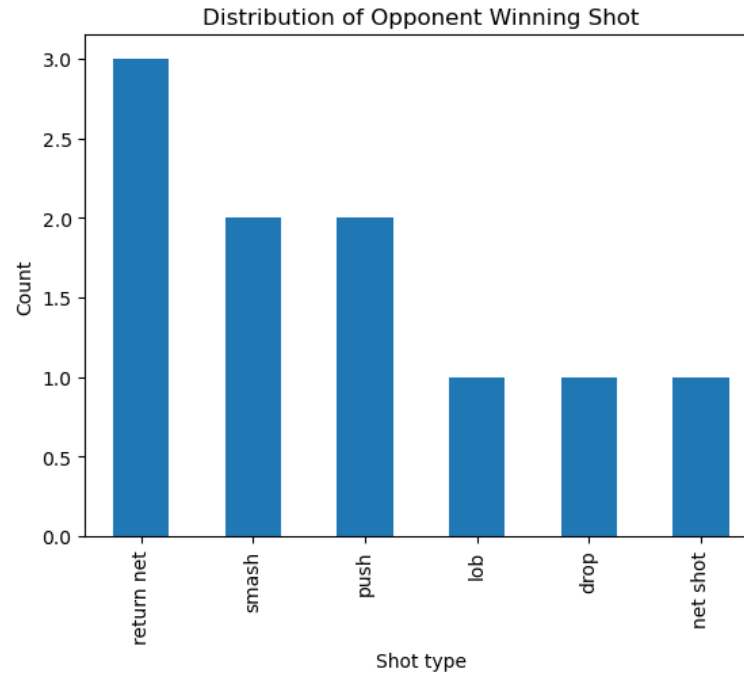


- For a given shot type, we present a plot on the coordinate system that shows where the ball was placed. It is color coded with the outcome of the shot i.e whether it was a winning shot, losing shot or the rally continued.
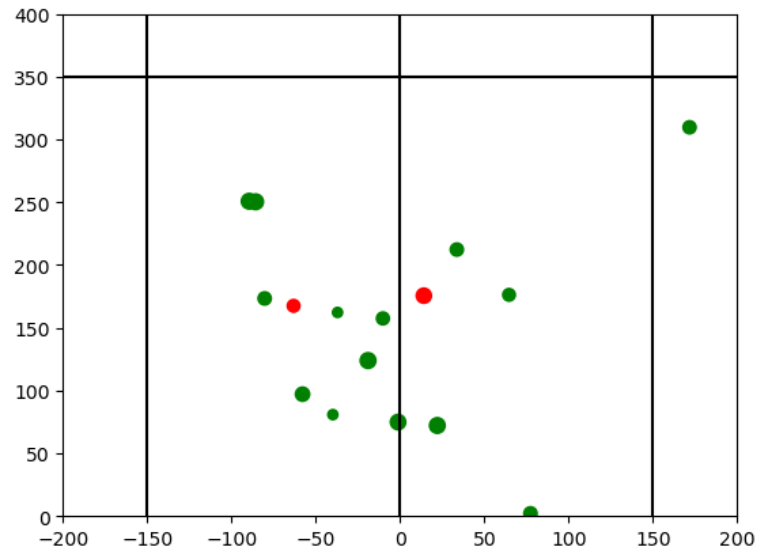
- Plot for shot type: smash. Size indicates the ball height. Green indicates rally continued. Red indicates loss of point.