Game, Set, Match

APCOMP215

Itamar Belson, Kenny Chen, Clay Coleman, Sam Crowder

Problem Statement

Game, Set, Match is an online application that aims to predict the winner between two profession tennis opponents. The prediction model is trained on a large public data set of past matches and their results.

Target Audience

- **Professional tennis players and coaches:** The prediction model can be used for preparation and strategy in matches or tournaments.
- **Sports bettors:** The prediction model can be used to inform betting strategies for betting on individual matches.
- **Tennis hobbyist:** The prediction model can be used by anyone interested in tennis to pin your favorite player against random opponents.

Value Prop

- Prediction in sports has become a growing field in ML, whether internally for player training and strategy or externally for sports betting. The US sports betting market is projected to reach **$17.1B** by 2029, with tennis accounting for over **$1B** of the market.

- While there has been significant work on other sports (e.g. football, basketball), our team decided to develop a prediction model for a relatively underserved sport, tennis.

Features

- The application enables the user to pin two players head-to-head and generates a prediction and win likelihood for the match.

- The application enables the user to chat with an integrated LLM to ask questions about tennis and individual players as an additional resource.

Google

tennispredictor.com

Game-Set-Match

Search Athlete

Search Athlete

Aleksandre Bakshi

Age: 27 (07/15/1997)
Country: Georgia
Weight: 161 lbs (73kg)
Height: 5'11" (180cm)

vs.

Alex De Minaur

Age: 25 (02/17/1999)
Country: Australia
Weight: 152 lbs (69kg)
Height: 6'0" (183cm)

78% 22%

In their last 5 meetings, Aleksandre Bakshi has beaten Alex De Minaur 4 times.
Additionally, Aleksandre Bakshi has won 9 of his last 11 matches.
We're betting on that hot streak to continue!

What is Alex De Minaur's record?

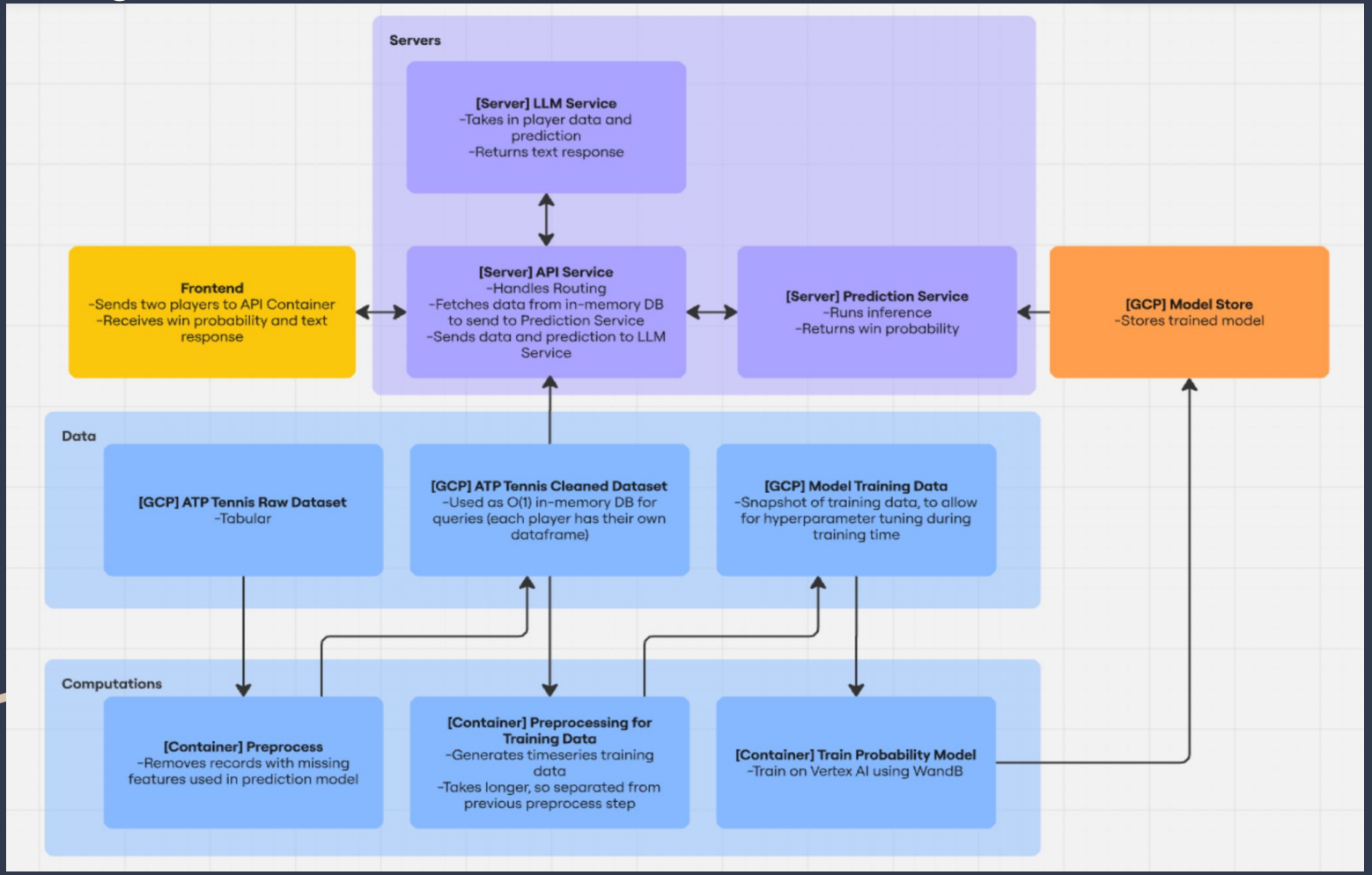
Alex De Minaur's record was 3-1 in 2024. He was undefeated in 2023 with a record of 5-0.

When did he play his last match?

He played his last match on September 18th, 2024.

Message...

Technical Design and Considerations



Model Data Details

- Two player IDs -> Fetch H2H stats and last 10 recent match results (for each player, regardless of opponent).
- H2H history stats
  - Win percentage
  - Total matches
- Last 10 match stats as proportion stats: (player_stat - opponent_stat) / opponent_stat
  - Rank
  - Height
  - Age
  - Aces
  - Double faults
  - Serve points
  - 1st serves in
  - 1st serve points won
  - 2nd serve points won
  - Number of serve games
  - Number of breakpoints saved
  - Number of breakpoints faced

Model Architecture Details

```
class TennisLSTM(nn.Module):
    def __init__(self, input_size, hidden_size, num_layers, h2h_size):
        super(TennisLSTM, self).__init__()
        self.dropout = nn.Dropout(0.5)
        self.lstm = nn.LSTM(input_size, hidden_size, num_layers, batch_first=True, dropout=.4)
        self.fc = nn.Linear(hidden_size * 2 + h2h_size, 64)
        self.fc2 = nn.Linear(64, 1)
        self.relu = nn.ReLU()

    def forward(self, x1, x2, h2h):
        _, (h1, _) = self.lstm(x1)
        _, (h2, _) = self.lstm(x2)
        h1 = h1[-1]
        h2 = h2[-1]
        combined = torch.cat((h1, h2, h2h), dim=1)
        x = self.relu(self.fc(combined))
        x = self.dropout(x)
        output = torch.sigmoid(self.fc2(x))
        return output
```

- LSTM block shared between both players last 10 match history.
- Final hidden layers concatenated together with historical data.
- Linear layers with ReLU.
- Sigmoid produces probability that player in 1st position (corresponding to x1) will win.

Next Steps

- Connect all remaining components together to ensure a complete backend system.
- Develop the front end application and connect it to the backend.
- Deploy the various services to virtual machines in GCP.
- Test the end-to-end system and improve the model accordingly.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