

Multi-Perspective Tracking

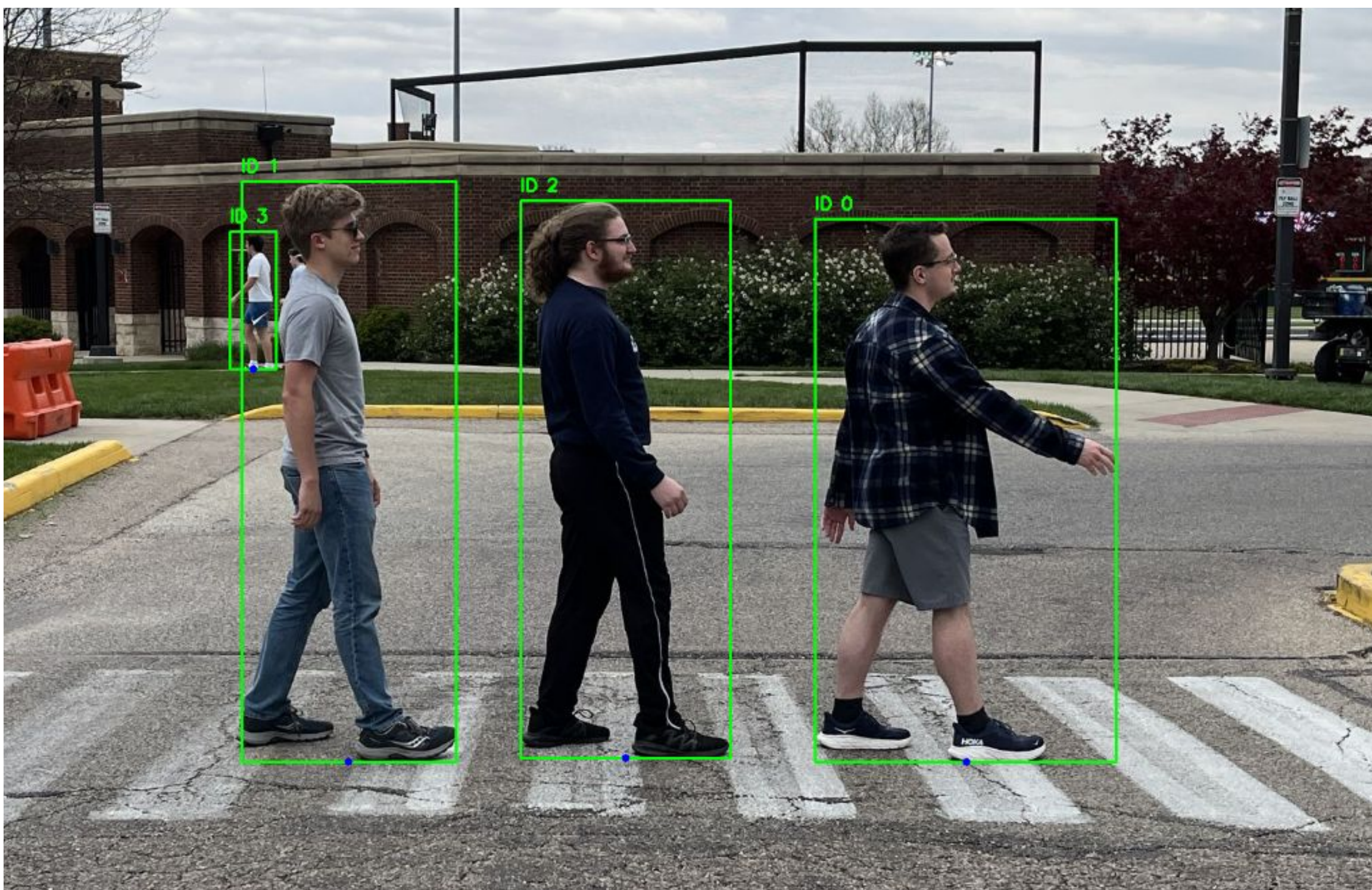
Michael Brown, Joe Crim, Jacob Rice Advisor: Peter Jamieson



Overview

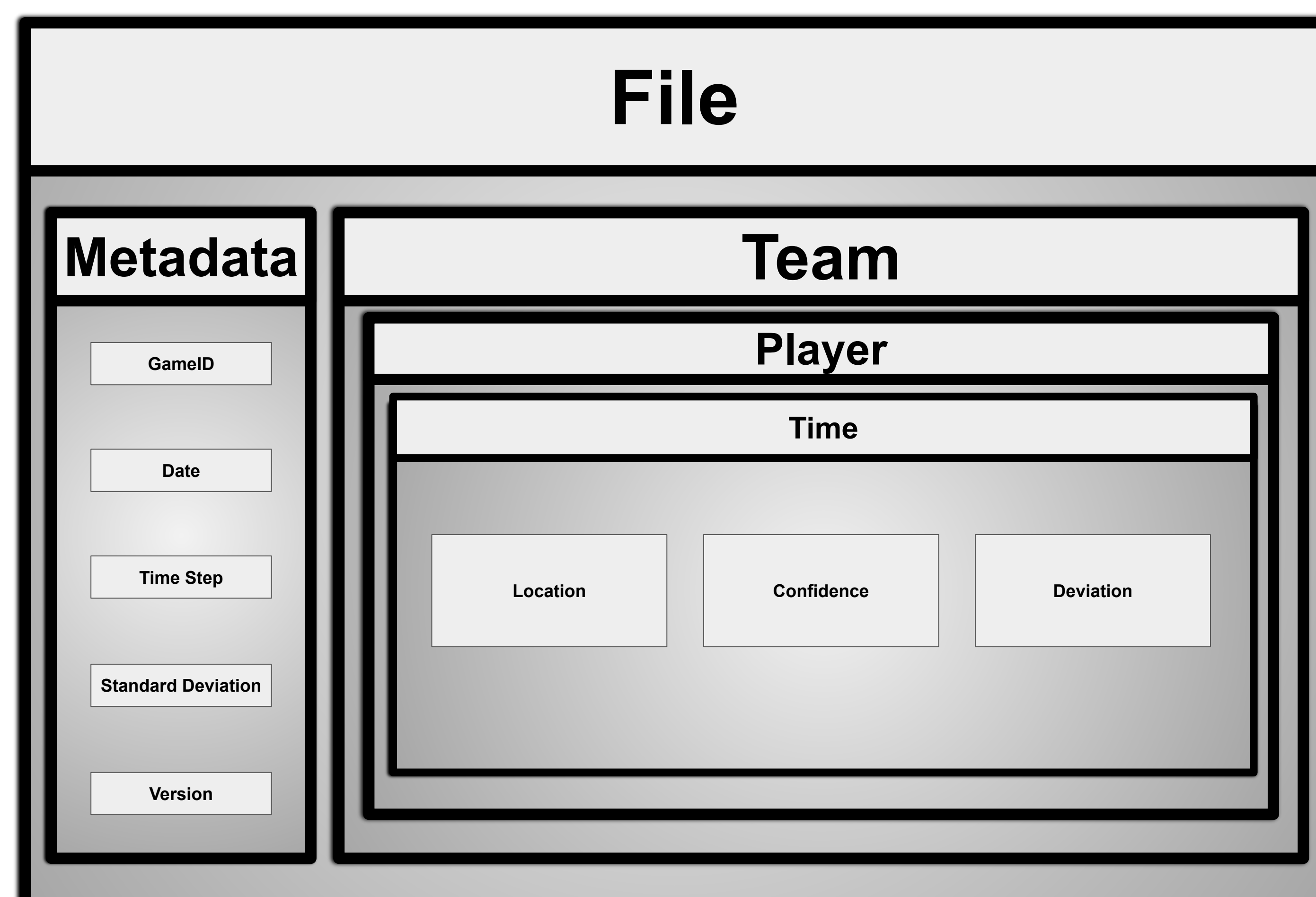
When analyzing a sports game or traffic patterns, there are large data sets containing time and location data (Spatial-Temporal Data). These data sets often contain inaccuracies and missing points. To remedy this, we developed a Python library using Bayesian probabilistic methodology to combine data sets from different perspectives of the same event. We further developed an image recognition and localization pipeline to acquire data from these different perspectives in our custom JSON format. The image recognition pipeline is covered in the Acquiring Data section of this poster and the Python library is discussed in the Combining Data section.

Acquiring Data

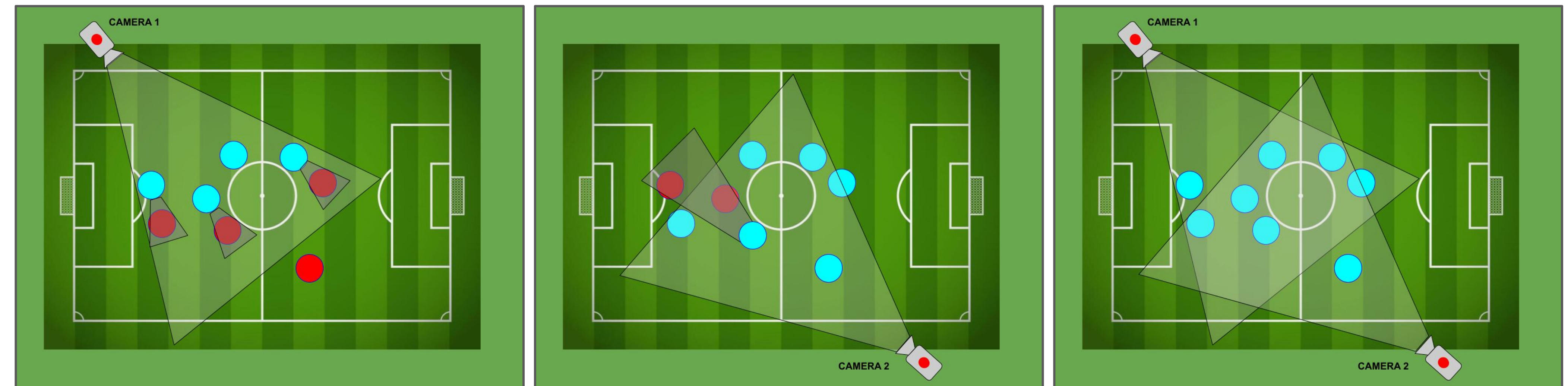


We run a transformer-based machine learning recognition model to generate bounding boxes post event. The generated boxes are then used for localization referencing a marker. ID's are assigned the first time an object is seen and tracked using color and box properties.

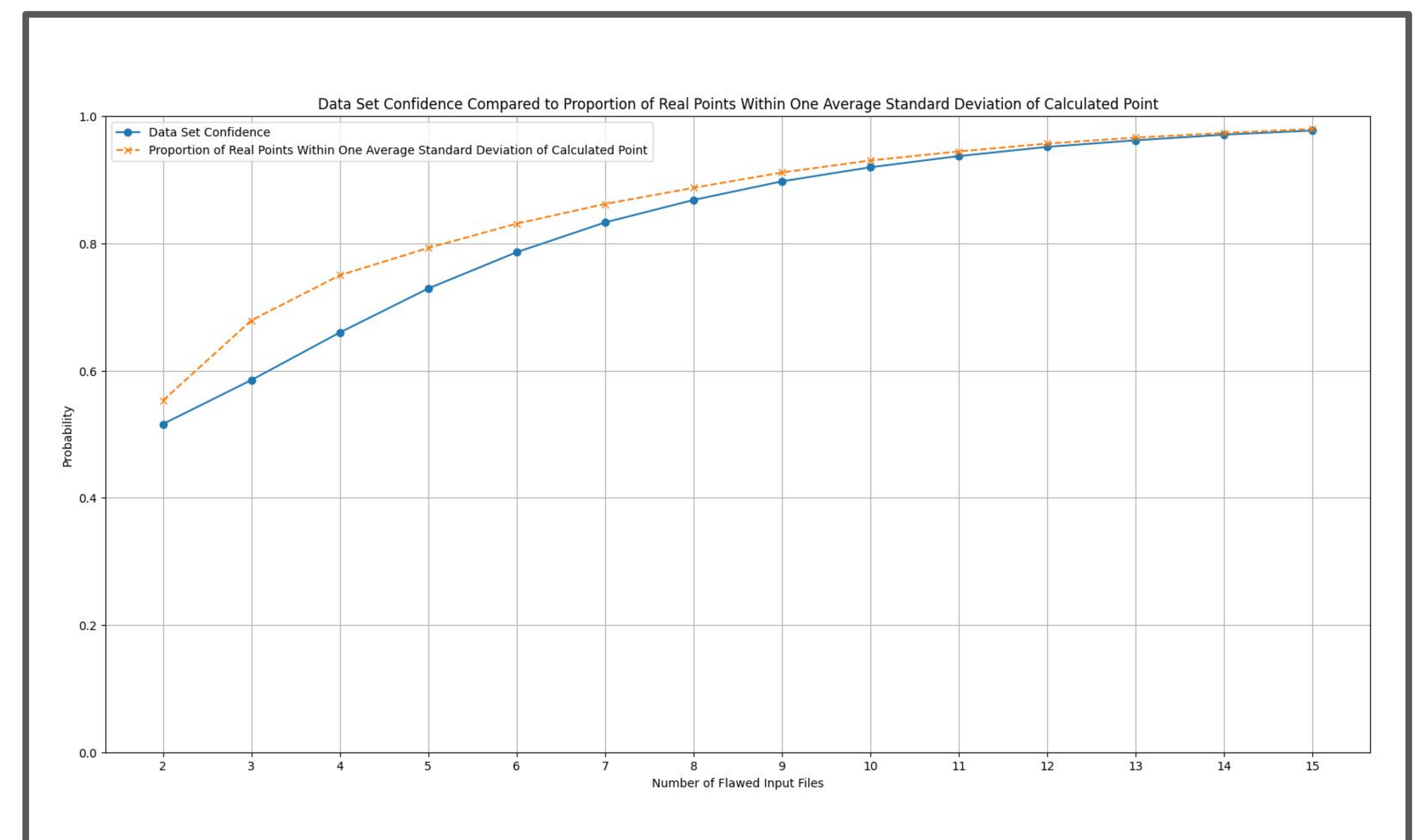
Our JSON Format



Combining Data



Camera angles suffer from occlusion and lack of detail at distance. Combining perspectives alleviates these issues.



To test our library, we took a data set and flawed it by removing 10% of the data and shifting 75% of the points by up to 15 units. We calculate the proportion of the points in the source data set that are within one average standard deviation of the points in our reconstructed data set. Our calculated confidence converges with the actual number of points within one average standard deviation, proving its validity. The confidence metric communicates the accuracy of the reconstructed point, making it the most important metric for drawing conclusions from our data.