

# Predicting Air Quality and PM 2.5 Levels from Canadian Wildfires Using AI

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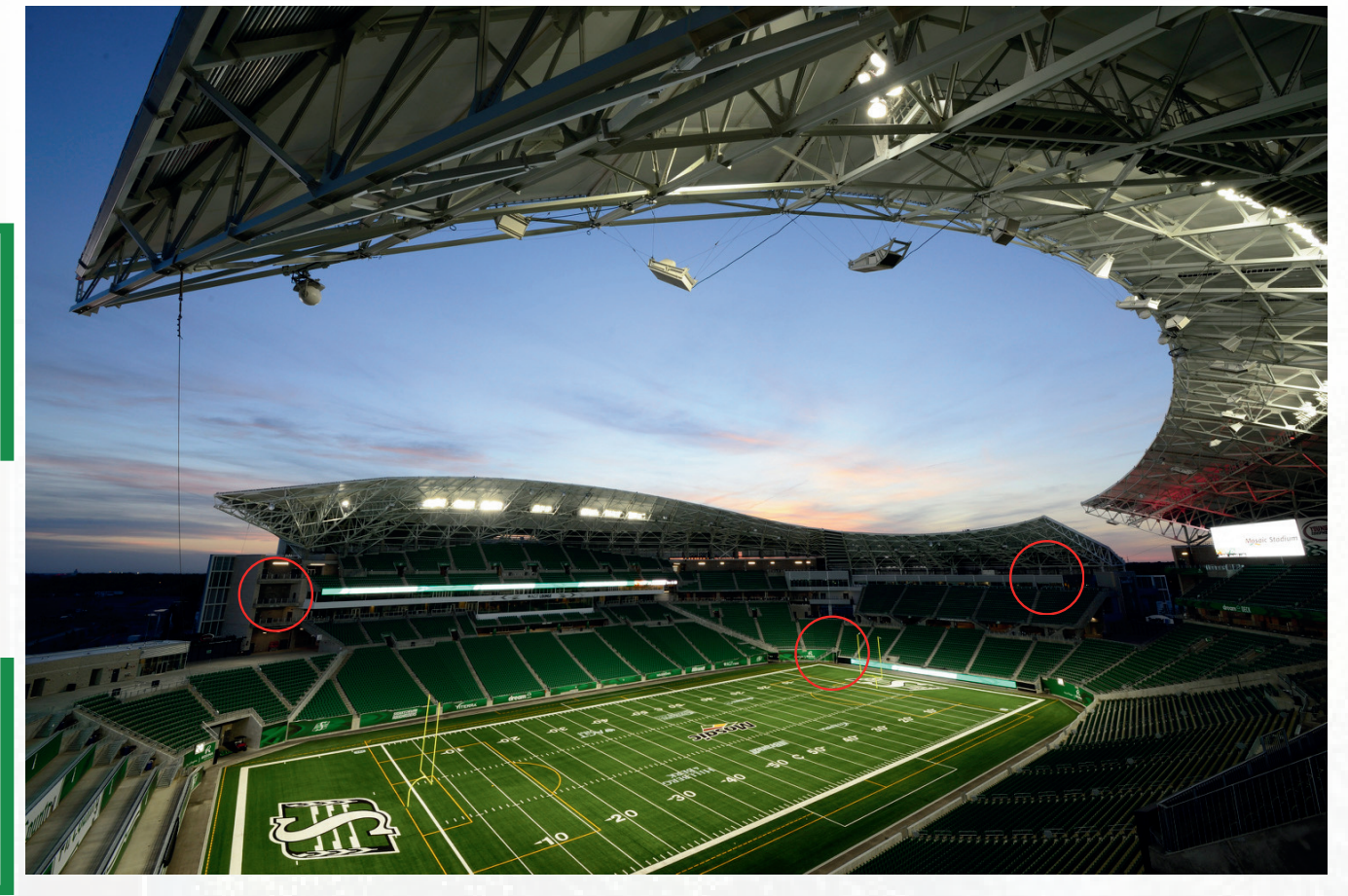
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liaison Dean Mitch

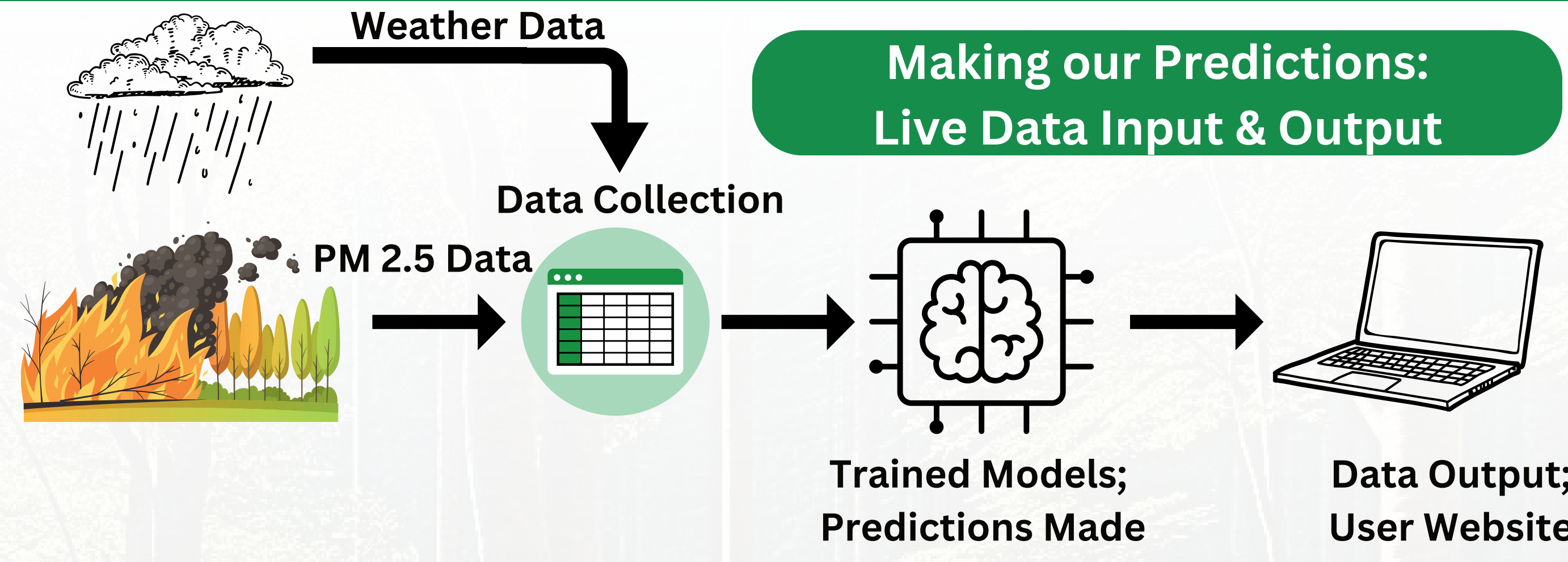


## Problem Statement

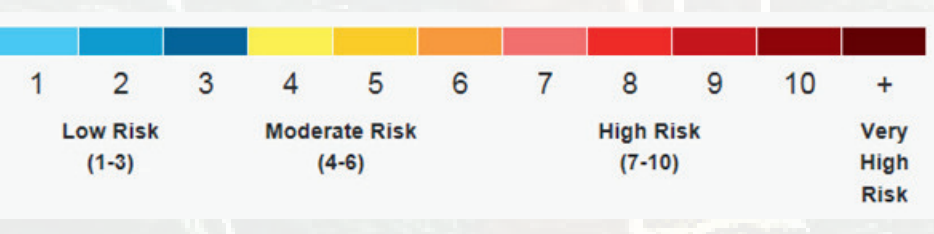
- Western Canadian forest fires pose a high risk increasing PM 2.5 values for all of North America
- The Saskatchewan Roughriders are looking to better protect their players and fans
- Our goal is to develop a prediction model for Mosaic Stadium and the Regina area to forecast PM 2.5 levels



PurpleAir Sensor (above) with locations of Sensors around Mosaic Stadium (left)



## Air Quality & AQHI

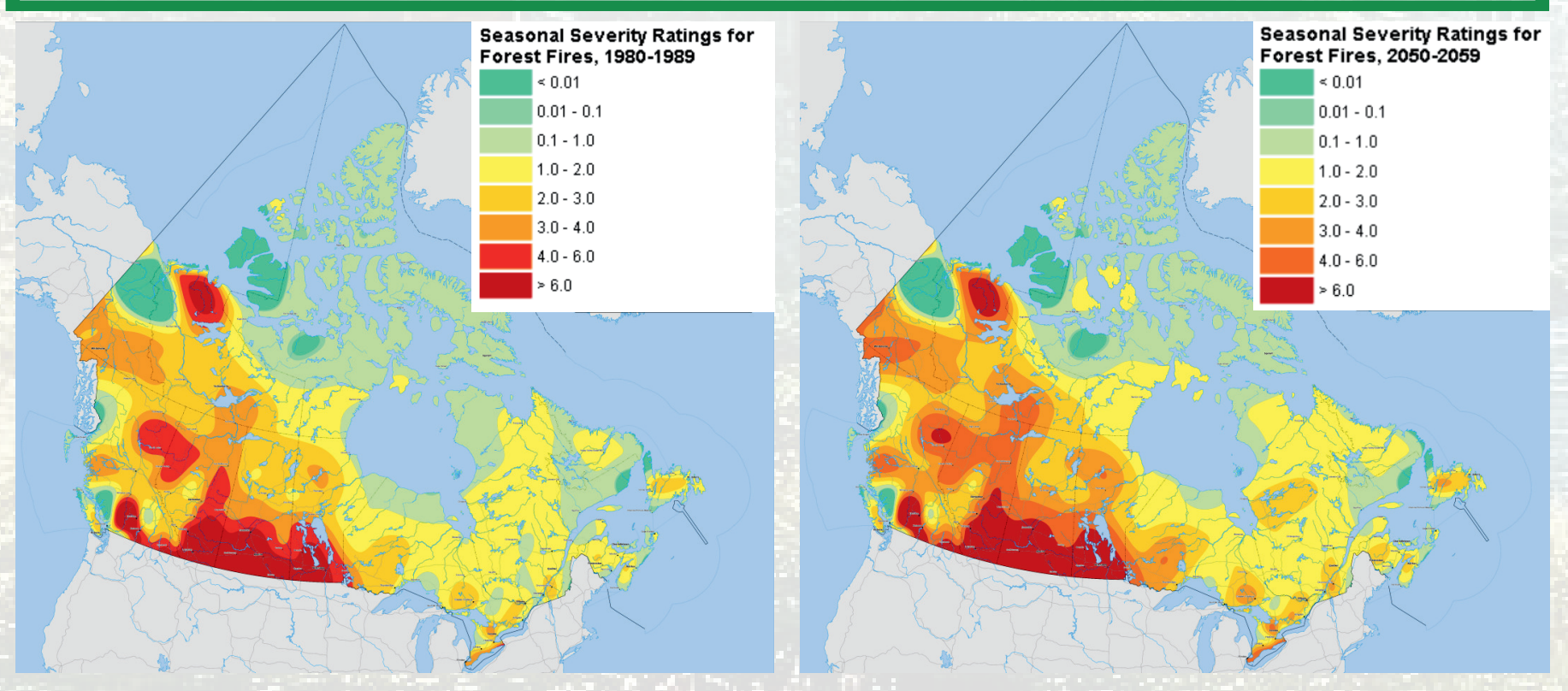


Canadian AQHI Scale

- Air Quality Health Index (AQHI); the current system for calculating & reporting Canada's air quality
- Particulate Matter 2.5 microns in diameter (PM 2.5) is the measurement value for smoke present in the atmosphere
- Primary Parameters which affect PM 2.5:
  - Wind speed & direction, relative humidity, atmospheric pressure, temperature, and dew-point temperature
- PurpleAir Sensors are our primary monitoring device

## Forest Fires: Are they Getting Worse?

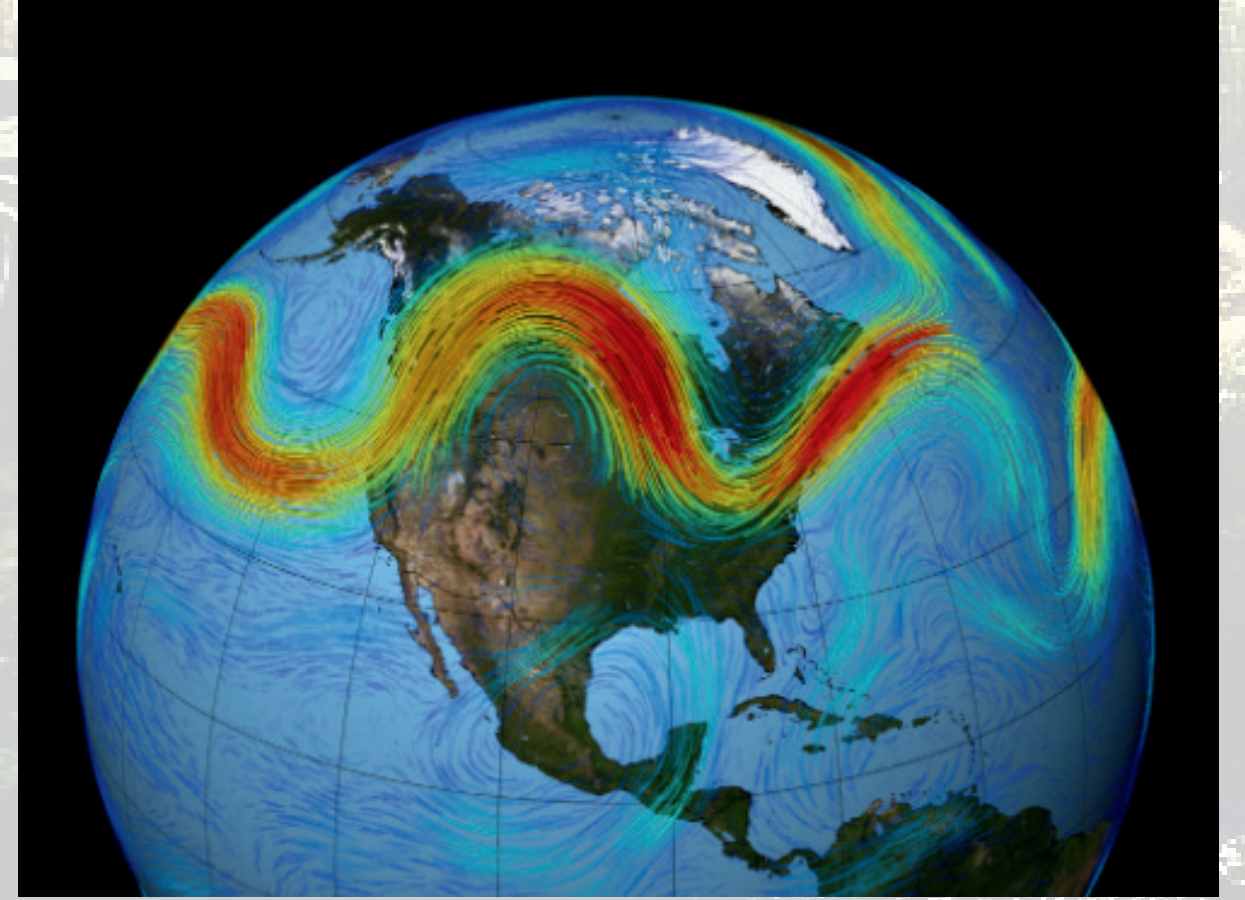
- ECCC projections using General Circulation Models predict increasing fire severity due to many factors
- Surface temp's, drought, etc.



## Atmospheric Data : Why only Western Canadian Fires?

- Easterly jetstreams drive forest fire particulate distribution into the prairies
- Since our latitude receives our jetstream from Western Canada, any active forest fires below the 49th parallel will not affect our air quality

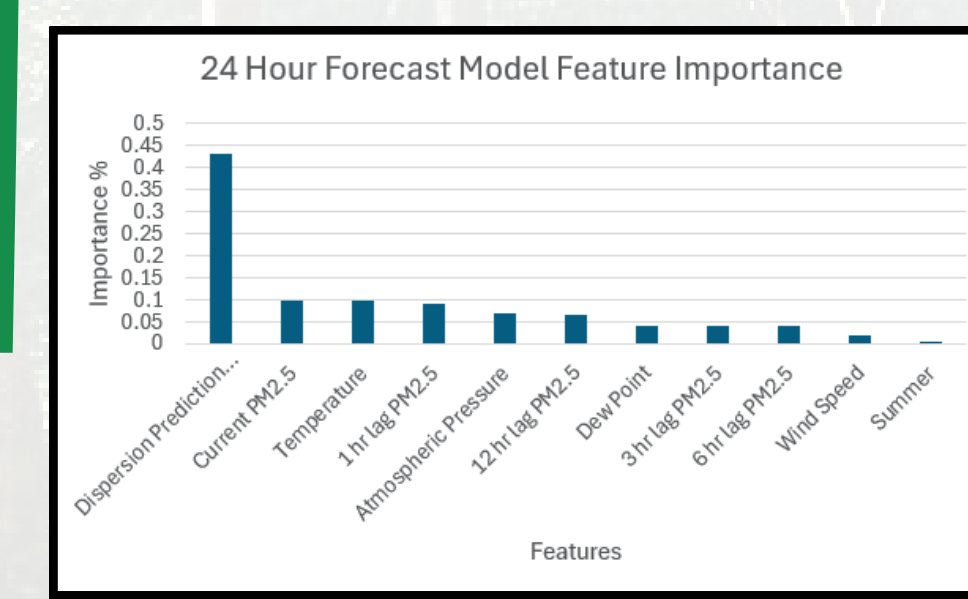
- Forest fire smoke is primarily carbon; low density and moderate sphericity drives particulate up into the stratosphere
- Tropopause folds along with highly active jetstreams drive this particulate down into the troposphere and into our cities



## Results : Our Predictions & Accuracy on Test Data



## What Parameters are Valuable?

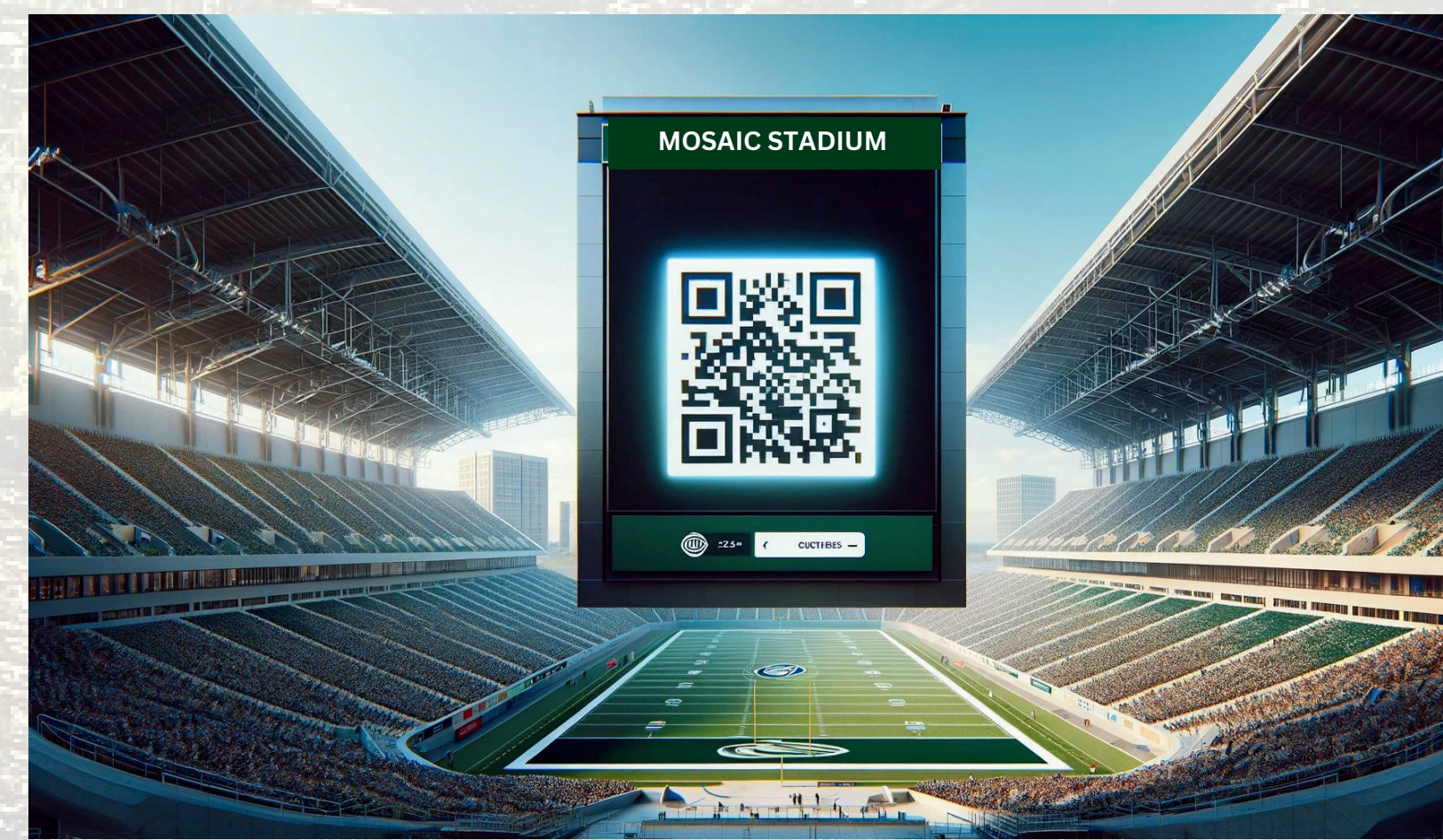


Percentage Importance for each prediction based on Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE)

$$RMSE = \sqrt{\frac{\sum(P_i - O_i)^2}{n}}$$

$$MAE = \frac{1}{n} * \sum|O_i - P_i|$$

O = Observed Value from testing data  
P = Predicted Value



Depiction of QR Code in use during a regular season game  
Mosaic Stadium Widget U of R Field Widget

