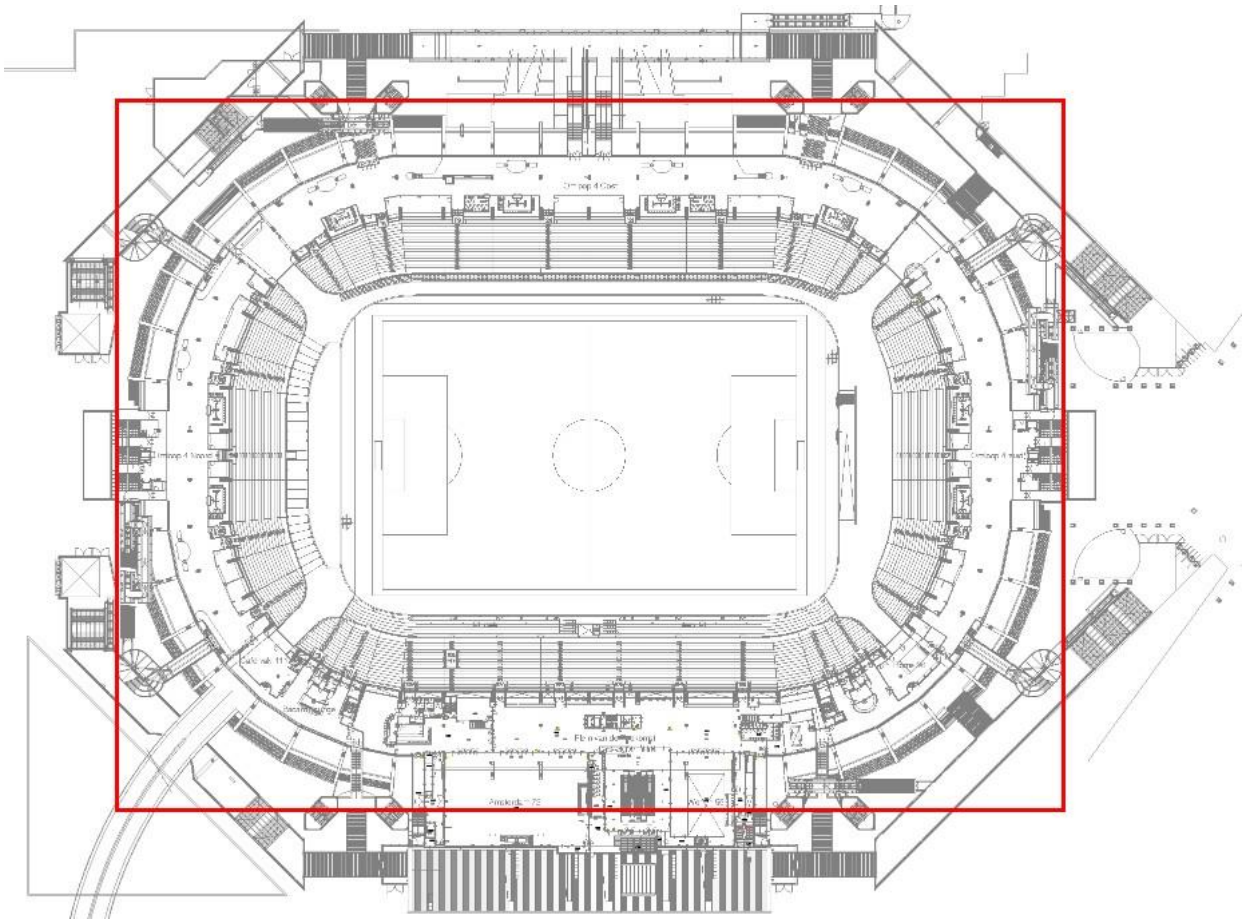
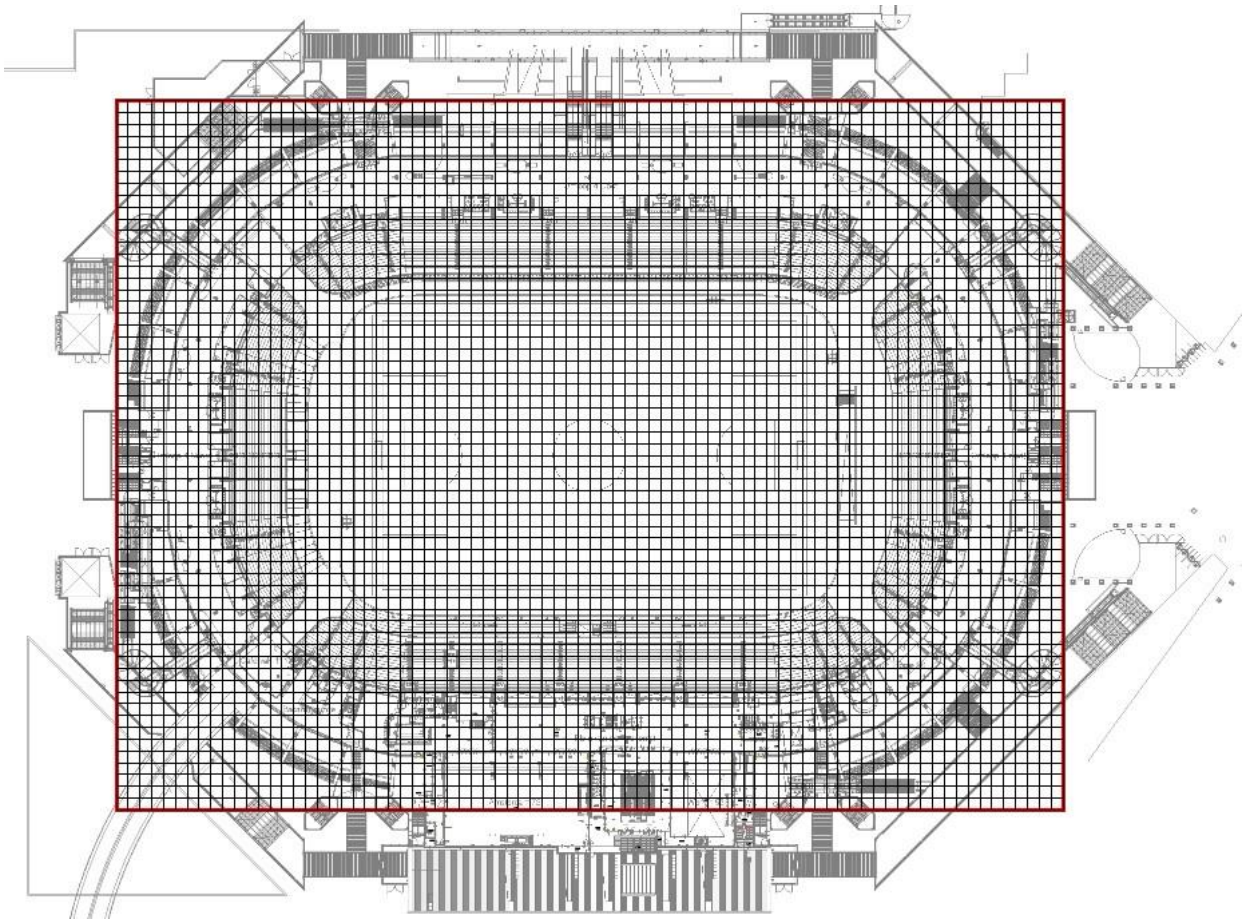
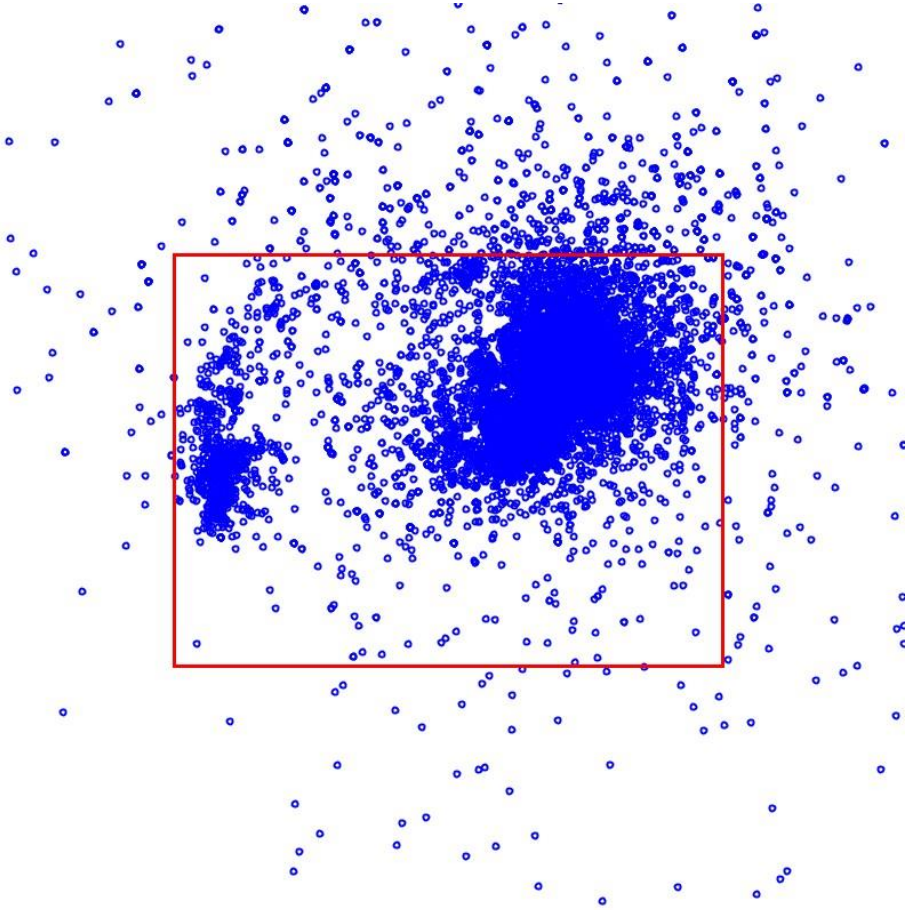
Region



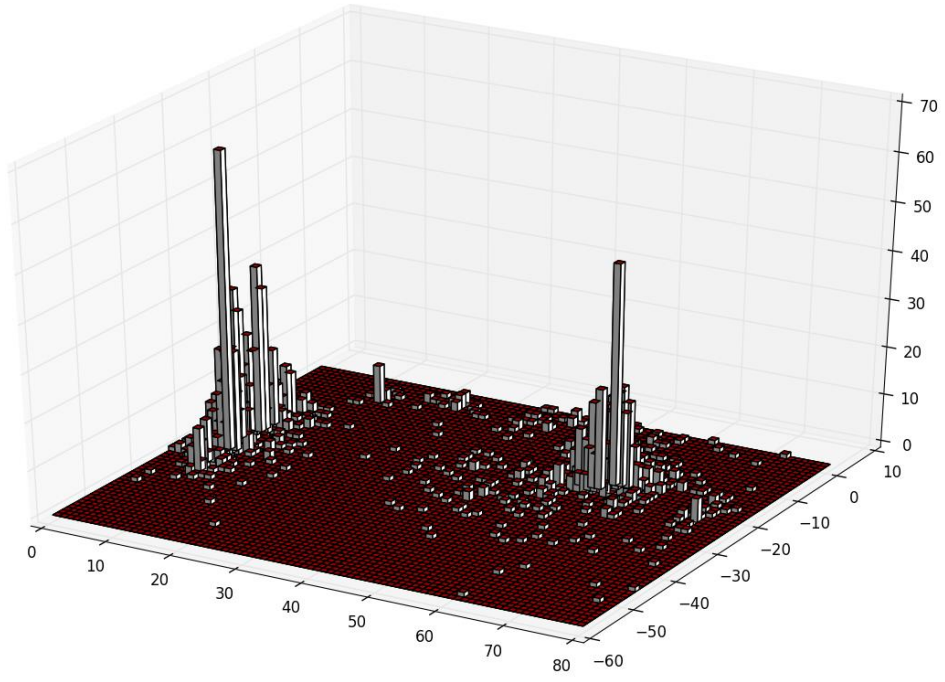
Binned region



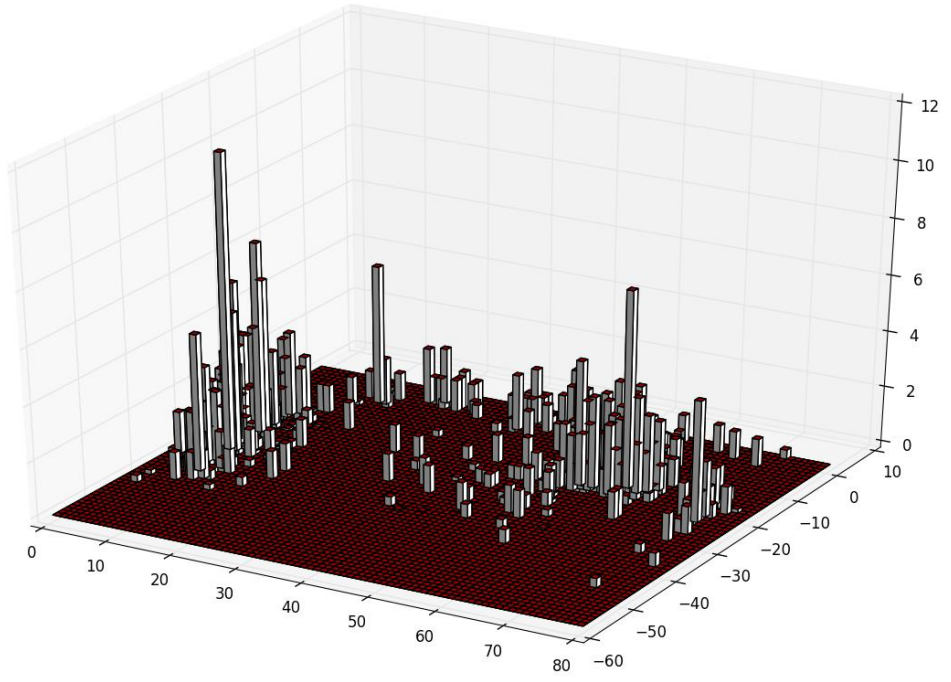
Positions vs. region



Frequency histogram



Density histogram



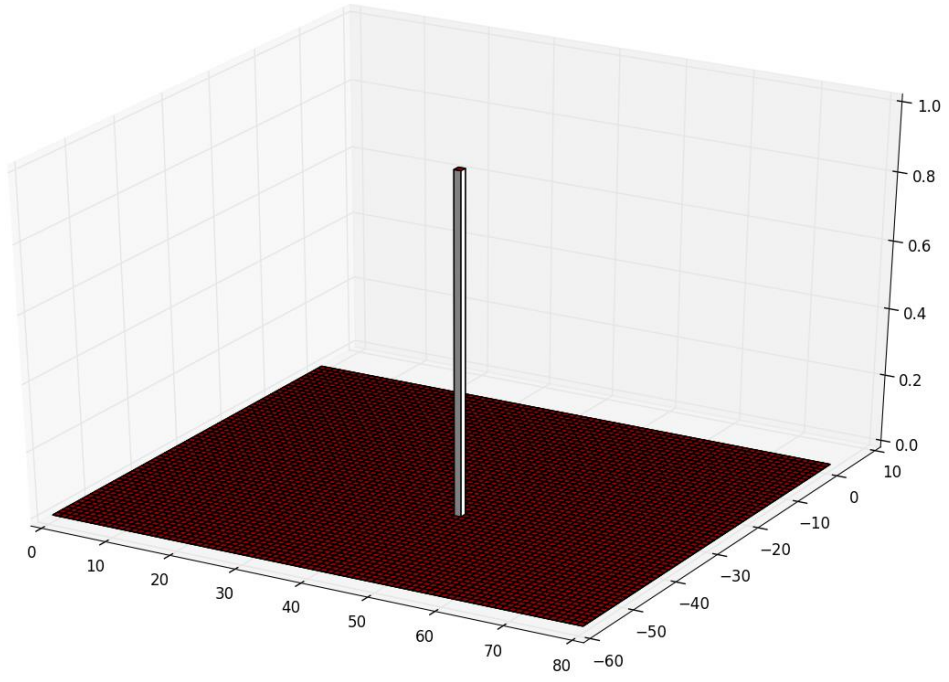
Method

- Kernel Density Estimation

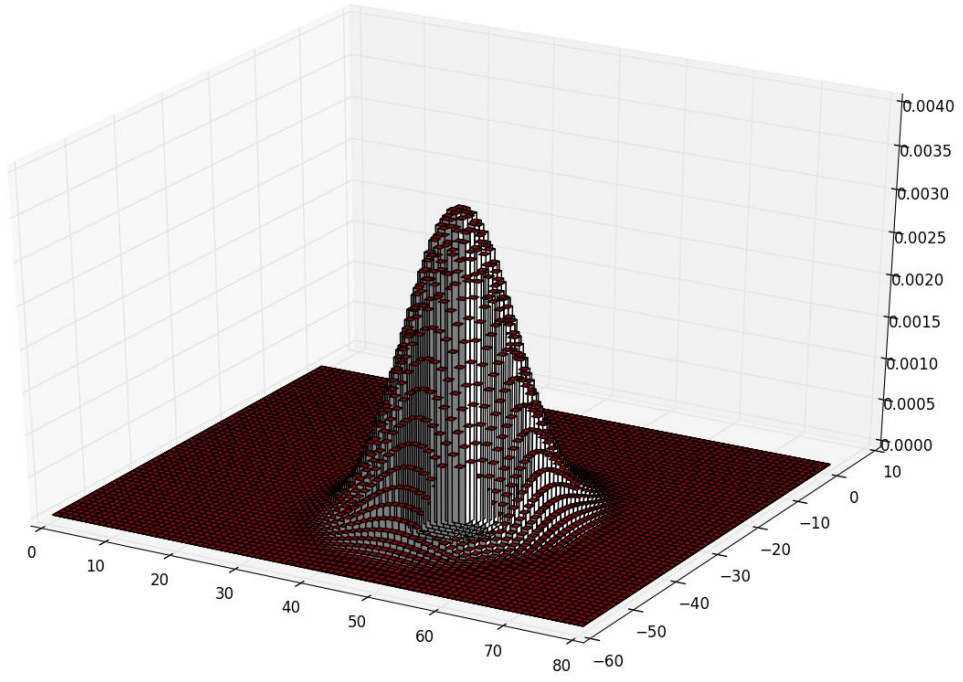
$$\hat{d}(x,y) = \frac{1}{N}\sum_{i=1}^{N} K\big((x - x_i), \sigma_x\big) K((y - y_i), \sigma_y)$$

$$K(u,\sigma) = \frac{1}{\sigma\sqrt{2\pi}} \exp(-\frac{u^2}{2\sigma^2})$$

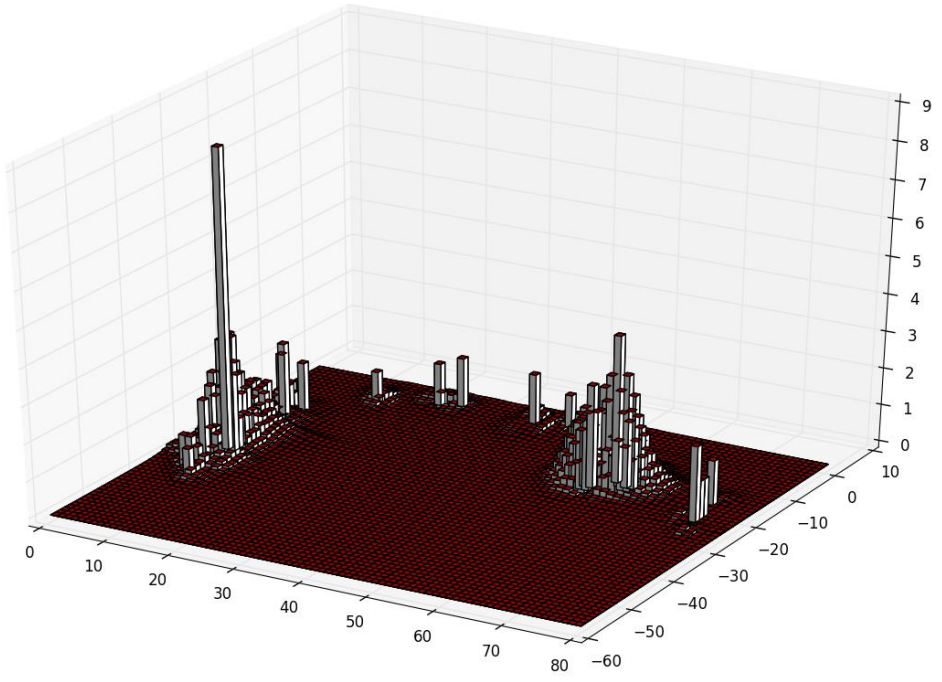
Position



Smoothed position



Smoothed density histogram

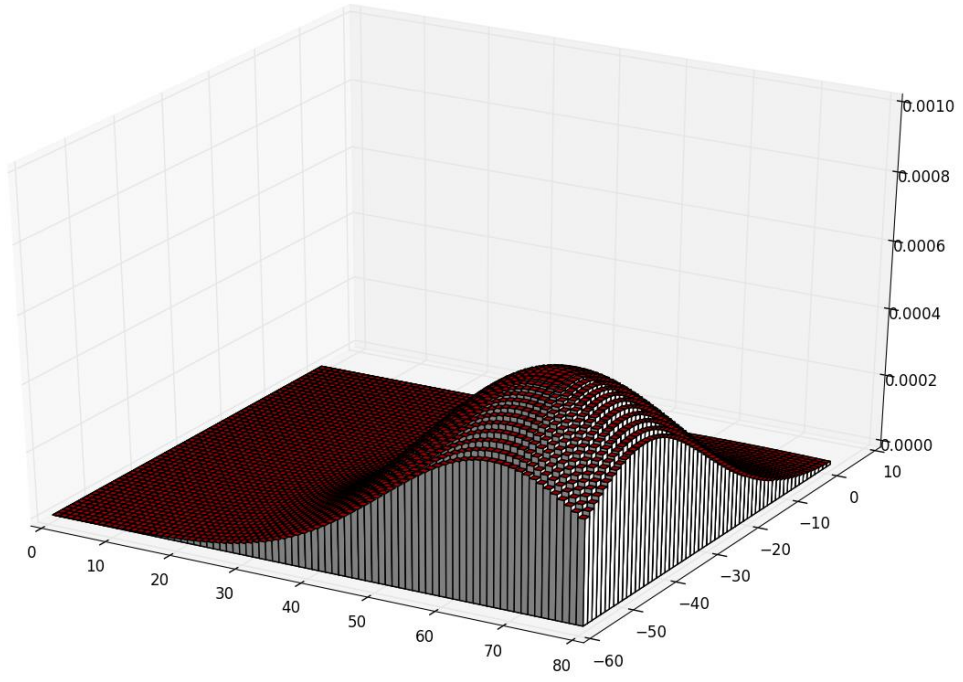


Method

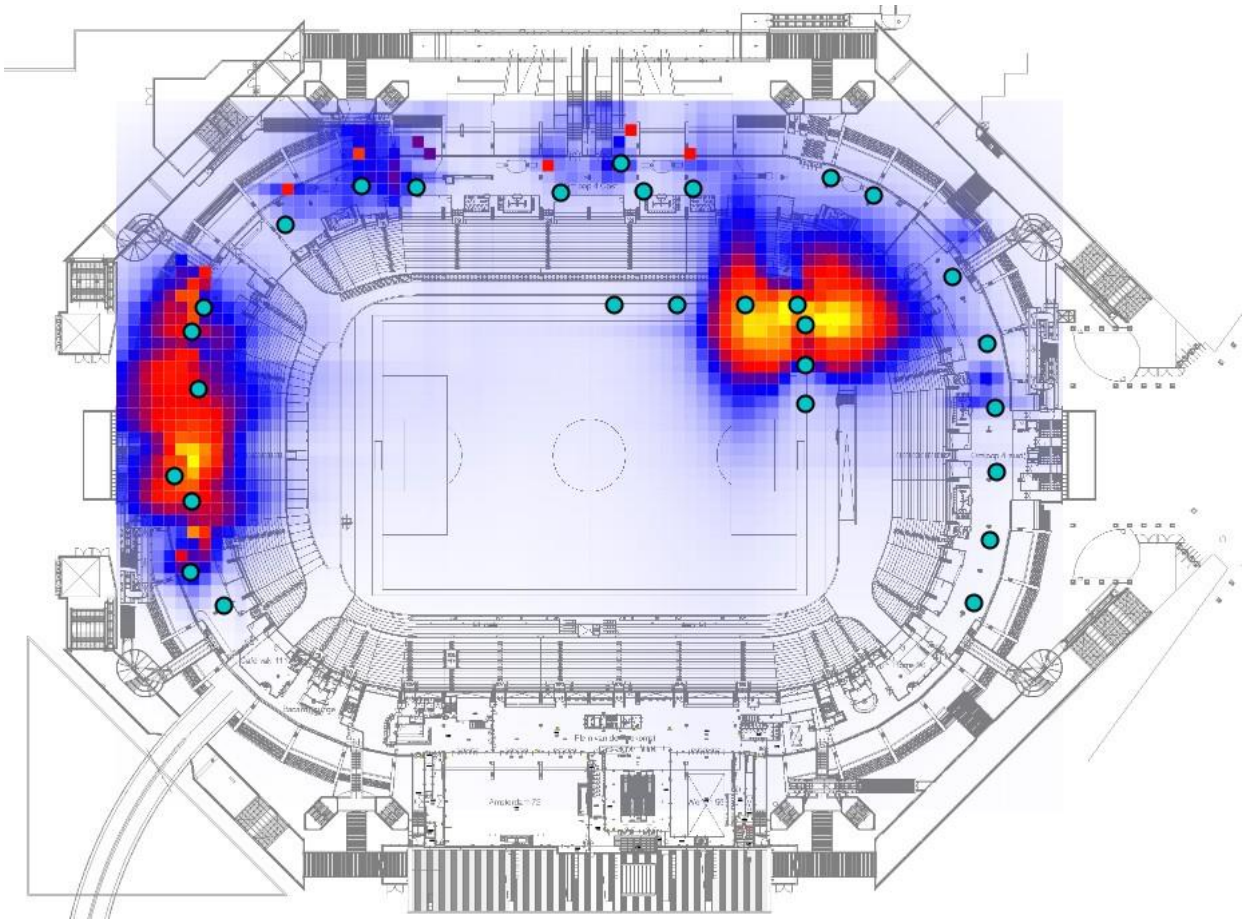
- Kernel Density Estimation

$$\int_R K(x)K(y) = 1$$

Smoothed position



Heat maps



Weighting scheme

- t = time window
- t_i = subwindow
- w_i = weight

$$\hat{d}(t) = \frac{w_1 \hat{f}(t_1) + w_2 \hat{f}(t_2) + \ldots + w_m \hat{f}(t_m)}{w_1 N_1 + w_2 N_2 + \cdots + w_m N_m}$$

Conservation of mass

- Total number of MACs detected should be constant
- Extrapolate for missing measurements
- Assume Brownian motion:

$$\langle (\Delta X)^2 \rangle = 2Dt$$

Conservation of mass