**Co-occurrence Histogram Detection** in frame $\mathbf{f}_k$

**Given:**

- A target template's Colour Co-occurrence Histogram , $\hat{q}$
- Kmeans centroids from computing $\hat{q}$
- The target template's dimensions, $(w_t, h_t)$.
- A frame to search, $\mathbf{f}_k$
- Starting point to search in $\mathbf{f}_k$ , $\mathbf{x}_0$
- $\mathbf{f}_k$'s dimensions, $(w_f, h_f)$
- The intersection threshold, $\tau$
- Number of levels in search, $n$
- Scale factors of template dimensions for each level, $sf_n$

**Localisation Loop**

$\mathbf{f}_k \leftarrow \mathbf{f}_k(\mathbf{x}_0(w_s, h_s))$

$n$=0

**True**

Return: $(\mathbf{x}_0, (w_s, h_s))$

**False**

Set search window, $\mathbf{w}_n$ dimensions using $(w_s, h_s) = (sf_n * w_t, sf_n * h_t)$

Set window step size, $(s_x, s_y)$ as a fraction, $\alpha$ of $\mathbf{w}$'s dimensions $(s_x, s_y) = (\alpha * w_s, \alpha * h_s)$

**Search Loop**

Convolve $\mathbf{w}$ with $\mathbf{f}_k$ with step $(s_x, s_y)$ for each overlap:

Compute candidate CH, $\hat{p}$ using kmeans centroids from the initial quantization of $\hat{q}$

Compute Intersection, $\mathbf{I}(\hat{q}, \hat{p})$

$\mathbf{I} \geq \mathbf{I}_{\max}$

**False**

**True**

Set new max intersection: $\mathbf{I}_{max} \leftarrow \mathbf{I}$
Set coordinates of best match: $\mathbf{x}_{best} \leftarrow \mathbf{x}$

finished convolving

**False**

**True**

$n \leftarrow n - 1$
$\mathbf{x}_0 \leftarrow \mathbf{x}_0 + \mathbf{x}_{best}$