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1 Pseudocode

Taylor Series: T(x,y) $\approx f(u,v) + (x-u)$f$_x$(u,v)+(y-v) f_y(u,v)+...

Rewriting the shifted intesity using the above formula:
I(x+u, y+v) $\approx I(x,y) + \partial$I$_{(x,y)}$/ ∂_x u + ∂I$_{(x,y)}$/ ∂_y v

Let: ∂I$_{(x,y)}$/ ∂x =I$_x$ and ∂I$_{(x,y)}$/ ∂y =I$_y$

i.e. I_x and I_y are image derivatives in the X and Y directions respectively.

then
E(u,v) = $\Sigma\ \omega(x,y)$ [$I(x,y)$+I$_x$ u + I_y v - I(x,y)]^2

E(u,v) = $\Sigma\ \omega(x,y)$ [I$_x$u + I_yv]^2

Expanding, E(u,v) = $\Sigma\ \omega(x,y)$ [I$_x{}^2$ u^2 + $I_y{}^2$ * v^2 + 2 I_x I_y u v]

Taking u,v out and re-write in Matrix notation give us:

E(u,v) $\approx (u,v)M(xy)$

Here, M = $\omega(x,y)*\begin{pmatrix} \Sigma\ I_x{}^2 & \Sigma I_x\ I_y \\ \Sigma\ I_x\ I_y & \Sigma I_y{}^2 \end{pmatrix}$

$R = min(\lambda 1, \lambda 2)$
det M = $\lambda 1\ \lambda 2$
trace M = $\lambda 1 + \lambda 2$