**LIST OF SYMBOLS**

\[ F(x,y) \]
> Image function

\[ D_{1,2} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \]
> Euclidean Distance between two pixel coordinates \((x_1, y_1) \) and \((x_2, y_2)\)

\((u, v), (DX, DY)\)
> Translation Vector along X and Y axes respectively

\[ \theta \]
> Rotation measure in radians

\( T(u,v) \)
> Transformed Image

\( R(u,v) \)
> Reconstructed Image

\( I_1 \) and \( I_2 \)
> Image matrices for Image 1 and Image 2

\( S_1 \) and \( S_2 \)
> Segmented image matrices for Image 1 and Image 2

\[ \oplus \]
> Dilation

\[ \ominus \]
> Erosion

\[ \mu \]
> Mutation rate function

\[ \delta \]
> Distance between an approximate and the exact solution

\[ \varepsilon \]
> Squared residual error

\[ \Delta(DX) \]
> Differences between the approximate and the exact values of \( DX \)

\[ \nabla \]
> Gradient of error for each parameter vector in current replication pool