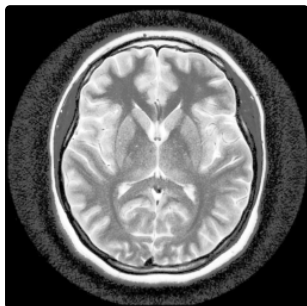# Image Registration Report using Particle Swarm Optimization (PSO)
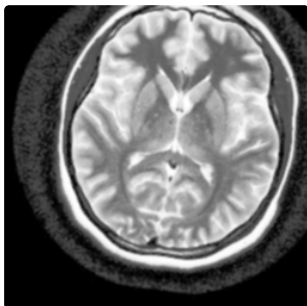
Results Summary

Results for image (13).jpg
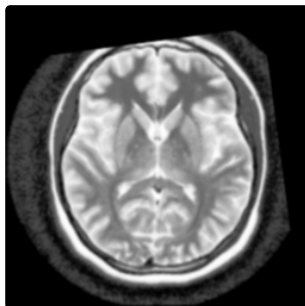
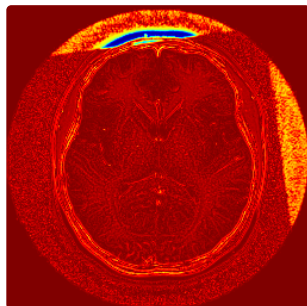| Reference	Distorted	Registered	Difference Map

Registration Quality

78%

Best Transformation Parameters

- Rotation: 7.66 degrees
- Translation X: -12.39 px
- Translation Y: 22.68 px
- Scaling: 0.92

Mean Square Error (MSE)

Value: 754.71

Interpretation: Lower values indicate better match

Structural Similarity (SSIM)

Value: 0.7874
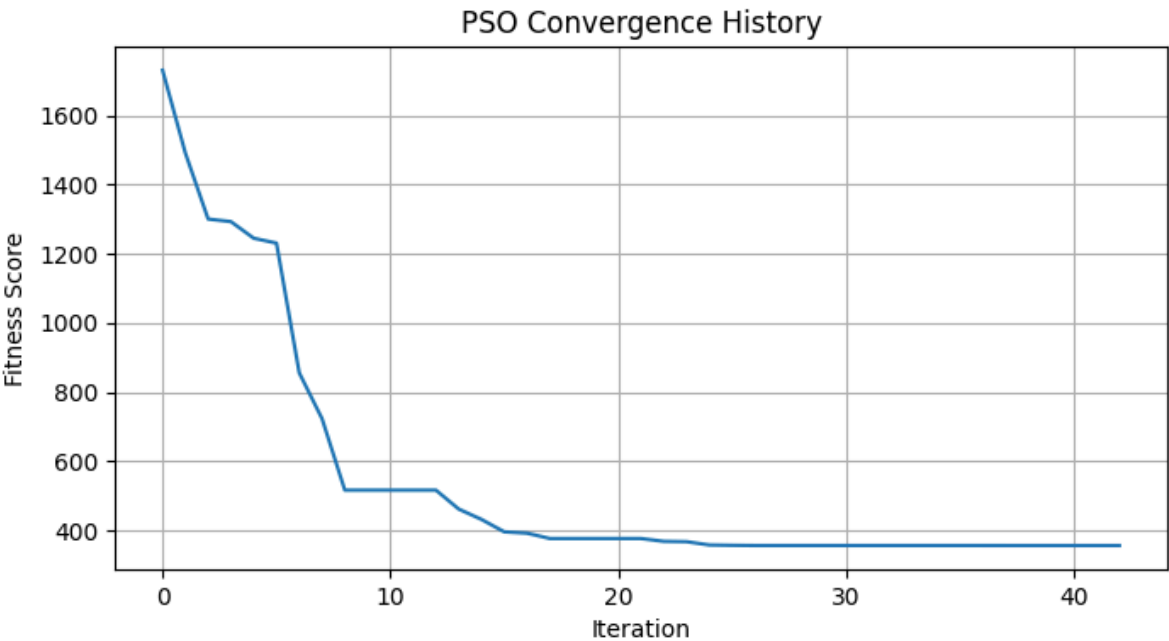
Interpretation: 1.0 means perfect match

Normalized Cross-Correlation (NCC)

Value: 0.9501

Interpretation: 1.0 means perfect match

Mutual Information (MI)

Value: 0.0401

Interpretation: Higher values indicate better match

PSO Convergence

Results for image (14).jpg

Reference	Distorted	Registered	Difference Map

Registration Quality

84%

Best Transformation Parameters

- Rotation: -33.31 degrees
- Translation X: -14.99 px
- Translation Y: 17.17 px
- Scaling: 1.16

Mean Square Error (MSE)

Value: 204.74

Interpretation: Lower values indicate better match

Structural Similarity (SSIM)

Value: 0.8453

Interpretation: 1.0 means perfect match

Normalized Cross-Correlation (NCC)

Value: 0.9854

Interpretation: 1.0 means perfect match
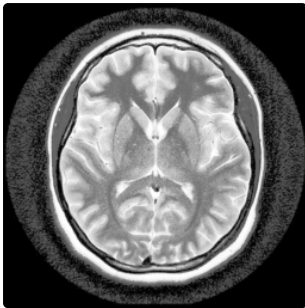
Mutual Information (MI)

Value: 0.0413

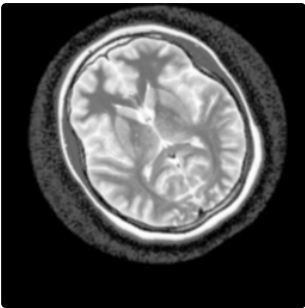**Interpretation:** Higher values indicate better match
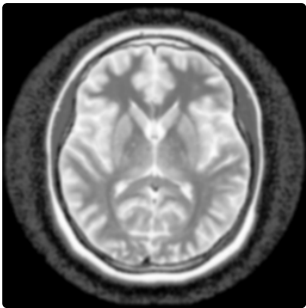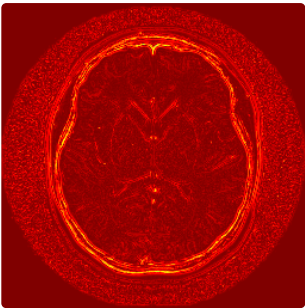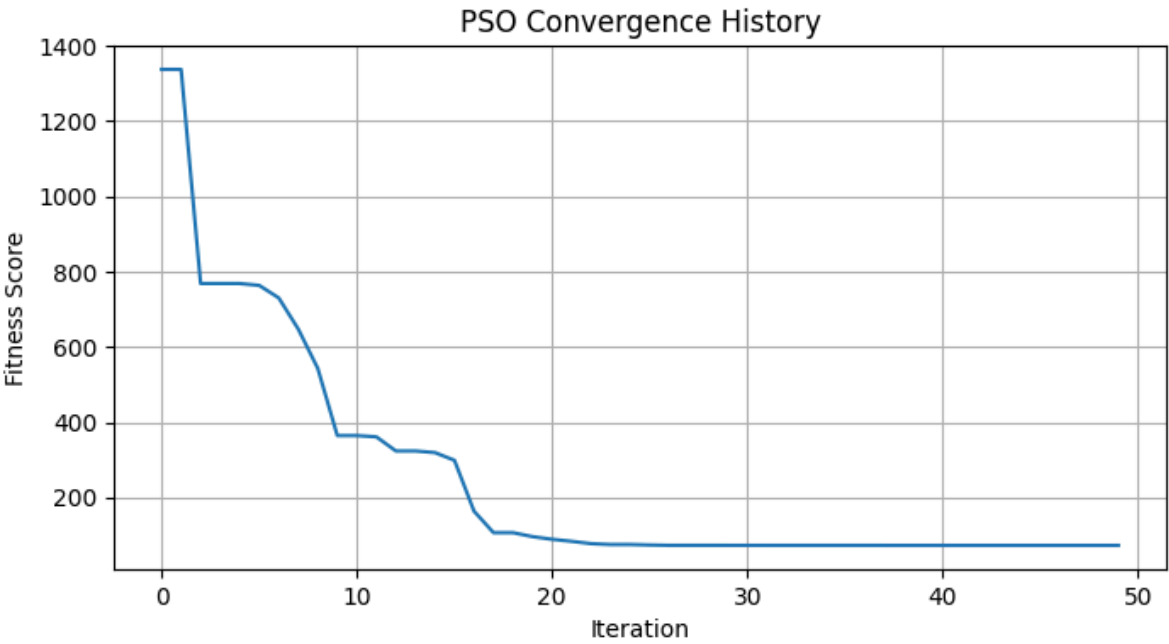
PSO Convergence

Results for image(15).jpg

Reference	Distorted	Registered	Difference Map

Registration Quality

80%

Best Transformation Parameters

- Rotation: 26.43 degrees
- Translation X: 14.11 px
- Translation Y: 18.52 px
- Scaling: 1.01

Mean Square Error (MSE)

Value: 1026.03

Interpretation: Lower values indicate better match

Structural Similarity (SSIM)

Value: 0.8077

Interpretation: 1.0 means perfect match

Normalized Cross-Correlation (NCC)

Value: 0.9371

Interpretation: 1.0 means perfect match

Mutual Information (MI)

Value: 0.0419

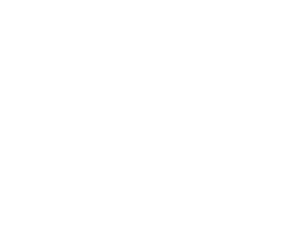**Interpretation:** Higher values indicate better match

PSO Convergence
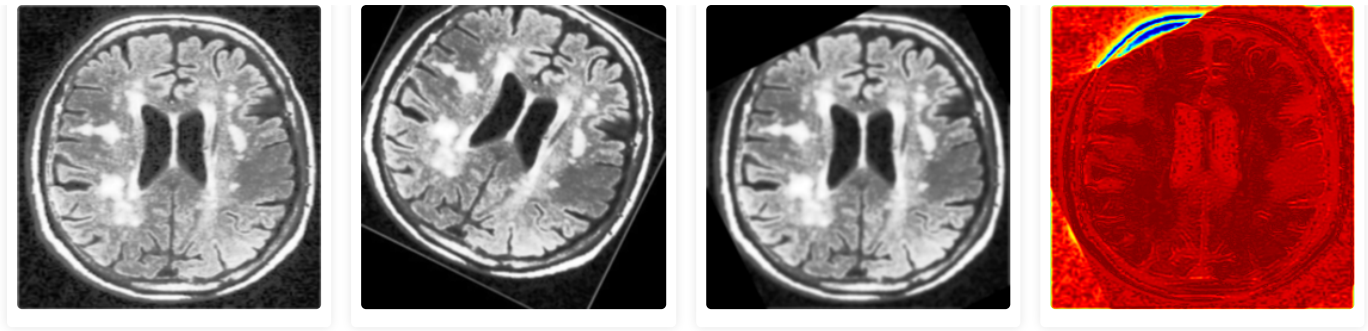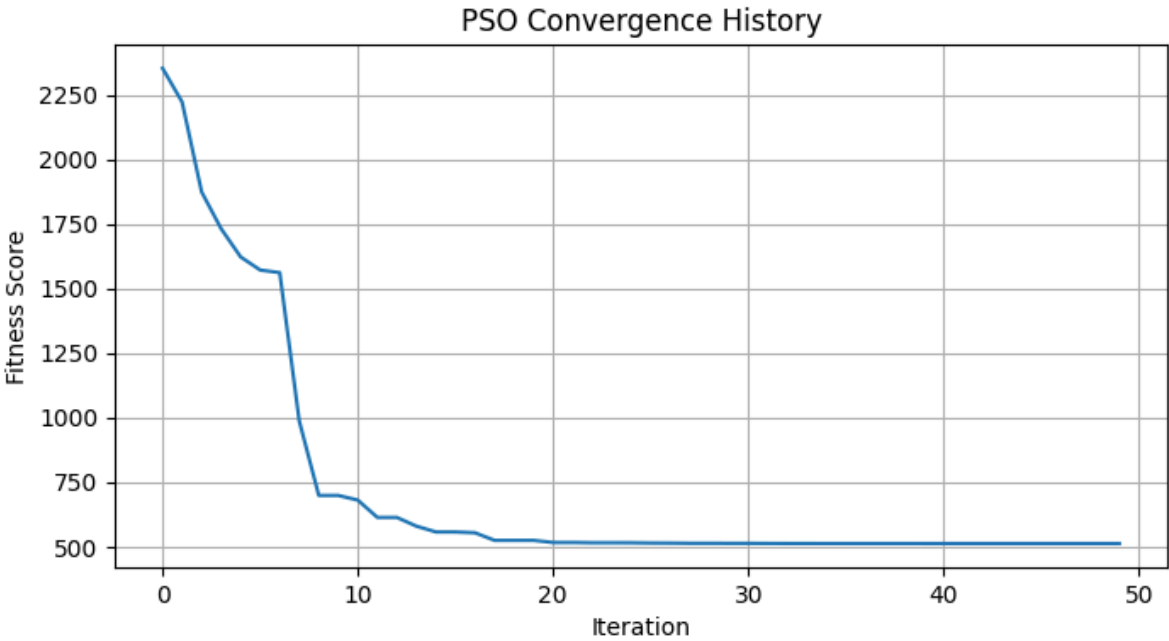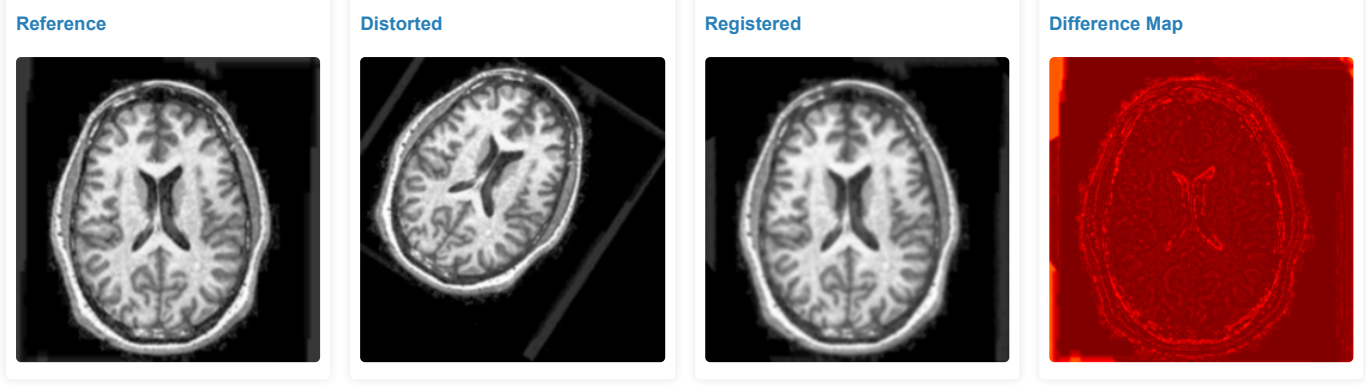

Results for image(187).jpg

Reference	Distorted	Registered	Difference Map

Registration Quality

93%

Best Transformation Parameters

- Rotation: 33.02 degrees
- Translation X: 32.46 px
- Translation Y: 15.22 px
- Scaling: 1.16

Mean Square Error (MSE)

Value: 97.74

Interpretation: Lower values indicate better match

Structural Similarity (SSIM)

Value: 0.9354

Interpretation: 1.0 means perfect match

Normalized Cross-Correlation (NCC)

Value: 0.9929

Interpretation: 1.0 means perfect match

Mutual Information (MI)

Value: 0.0423

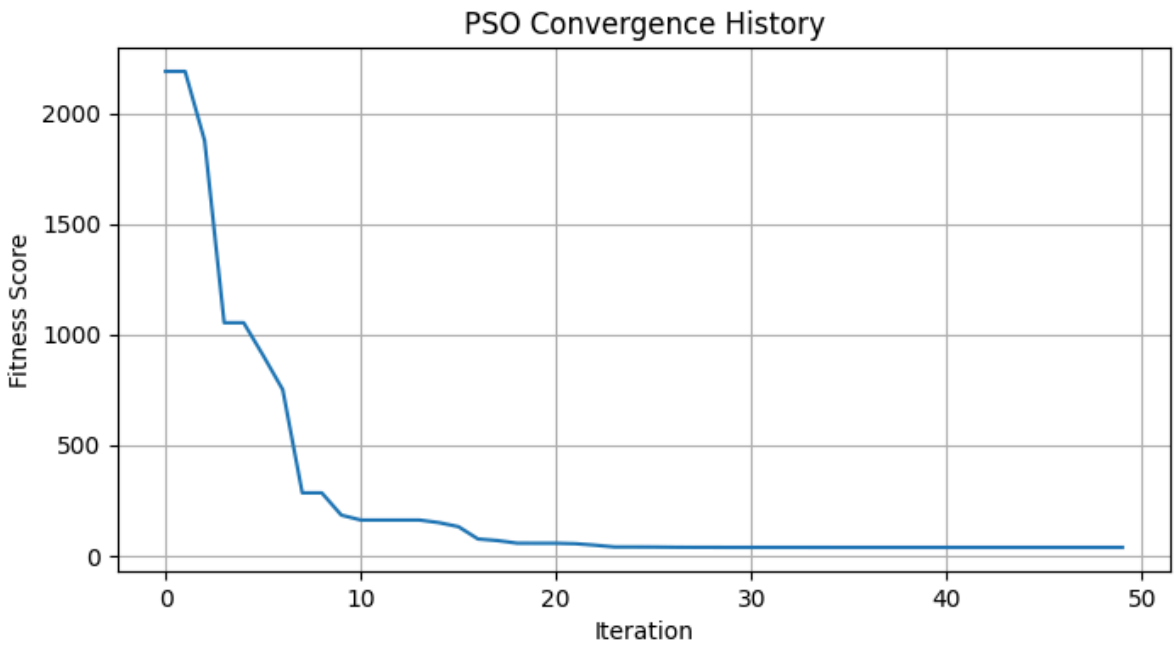**Interpretation:** Higher values indicate better match

PSO Convergence

PSO Convergence History

Image Name	SSIM	NCC	MSE	Quality
image (13).jpg	0.7874	0.9501	754.71	Medium (78%)
image (14).jpg	0.8453	0.9854	204.74	Medium (84%)
image(15).jpg	0.8077	0.9371	1026.03	Medium (80%)
image(187).jpg	0.9354	0.9929	97.74	Good (93%)