

MANNET: A LARGE-SCALE MANIPULATED IMAGE DETECTION DATASET AND BASELINE EVALUATIONS

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1. BASELINE EXPERIMENTAL RESULTS

Additional results of the *Intra Set* and *Inter Set* experiments are summarized in the following subsections.

1.1. Intra Set Experiments

Tables 1 and 4 shows the results of the intra set experiments on Set 1 and Set 4, respectively. Results at recall 1 corresponding to Sets 2 and 3 are shown in the main paper. Here, in Tables 2 and 3, we have shown the results on these sets at recall 5 and 10. For better interpretability we have also included the results at recall 1 on these sets.

1.2. Inter Set Experiments

Tables 5, 6, and 7 show the results of the inter set experiment on Sets 2, 3, and 4, respectively, when the network is trained on Set 1. Similarly, results on Sets 1, 3, and 4 are shown in Tables 8, 9, and 10, respectively, when the network is trained on Set 2. In these experiments, the network is trained on handcrafted transformed images and evaluated on both handcrafted and learning based transformed images. Next, Tables 11, 12, and 13 summarizes the results on Sets 1, 2, and 4, respectively, using the network trained on Set 3. Finally, the results on Sets 1, 2, and 3 are reported in Tables 14, 15, and 16, respectively, when the network is trained on Set 4. Here, the network is trained on GAN generated transformed images and evaluated on both handcrafted and learning based transformed images.

Table 1. Results for the intra set experiment. The network is trained and evaluated on Set 1. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 1	Recall @ 1			Recall @ 5			Recall @ 10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	95.11%	59.54%	29.26%	98.87%	70.03%	32.61%	99.50%	74.57%	34.52%
<i>Scaling</i>	95.72%	97.91%	61.36%	98.73%	99.32%	71.68%	99.20%	99.59%	74.89%
<i>Translation</i>	87.12%	95.33%	85.06%	95.58%	98.67%	91.88%	97.43%	99.18%	93.60%
<i>Rotation</i>	96.41%	91.70%	35.28%	99.27%	97.92%	50.19%	99.64%	98.89%	56.16%
<i>Salt & Pepper Noise</i>	98.62%	99.80%	88.60%	99.64%	99.99%	93.64%	99.82%	100.00%	94.95%
<i>Gamma Correction</i>	67.47%	61.99%	0.12%	80.86%	75.91%	0.38%	85.55%	80.78%	0.55%
<i>Blurring</i>	97.81%	99.72%	89.92%	99.14%	99.91%	94.21%	99.41%	99.96%	95.33%
<i>Shearing</i>	99.90%	99.94%	86.75%	100.00%	100.00%	92.36%	100.00%	100.00%	93.91%
<i>Perspective Transform</i>	94.76%	97.73%	77.81%	98.79%	99.25%	86.62%	99.44%	99.60%	89.10%
<i>Warping</i>	99.87%	99.94%	94.10%	99.99%	100.00%	96.93%	100.00%	100.00%	97.58%
<i>Filters</i>	35.22%	50.73%	19.67%	49.60%	64.13%	31.76%	55.84%	69.05%	36.97%
Overall	88.00%	86.76%	60.72%	92.77%	91.37%	67.48%	94.17%	92.88%	69.78%

Table 2. Results for the intra set experiment. The network is trained and evaluated on Set 2. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 2	Recall @ 1			Recall @ 5			Recall @ 10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	96.04%	61.12%	33.86%	99.53%	72.61%	40.02%	99.78%	77.41%	43.68%
<i>Scaling</i>	99.60%	94.43%	83.66%	99.98%	98.16%	89.63%	99.98%	98.78%	91.32%
<i>Translation</i>	99.85%	98.11%	96.84%	100.00%	99.65%	98.86%	100.00%	99.83%	99.20%
<i>Rotation</i>	98.83%	96.54%	71.62%	99.88%	99.73%	83.66%	99.95%	99.90%	87.39%
<i>Salt & Pepper Noise</i>	99.88%	93.41%	92.29%	100.00%	97.96%	96.54%	100.00%	99.10%	97.74%
<i>Gamma Correction</i>	93.43%	9.33%	0.67%	98.03%	20.20%	1.39%	98.86%	28.31%	2.24%
<i>Blurring</i>	99.25%	96.44%	94.63%	99.80%	98.63%	97.16%	99.90%	99.20%	97.79%
<i>Shearing</i>	99.85%	98.31%	87.69%	100.00%	99.83%	93.76%	100.00%	99.85%	95.32%
<i>Perspective Transform</i>	98.73%	90.50%	86.77%	99.98%	97.26%	92.99%	100.00%	98.73%	94.43%
<i>Warping</i>	100.00%	100.00%	98.76%	100.00%	100.00%	99.65%	100.00%	100.00%	99.78%
<i>Filters</i>	92.81%	22.01%	33.48%	96.84%	36.14%	47.61%	97.96%	43.86%	53.51%
Overall	98.03%	78.20%	70.93%	99.46%	83.65%	76.48%	99.67%	85.91%	78.40%

Table 3. Results for the intra set experiment. The network is trained and evaluated on Set 3. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 3	Recall @ 1			Recall @ 5			Recall @ 10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
Cycle GAN									
<i>Van-gogh</i>	99.60%	94.03	5.07%	100.00%	97.61	10.75%	100.00%	98.81	14.03%
<i>Monet</i>	100.00%	97.61	3.78%	100.00%	99.00	8.26%	100.00%	99.40	11.14%
<i>Ukiyoe</i>	98.21%	80.10	0.70%	99.80%	90.25	2.69%	99.90%	94.13	3.98%
<i>Cezanna</i>	99.80%	97.21	4.08%	100.00%	98.71	8.46%	100.00%	99.10	11.74%
Cartoon GAN									
<i>Shinkai</i>	98.71%	92.04	7.76%	99.60%	96.32	15.32%	99.70%	97.31	18.81%
<i>Hayao</i>	98.41%	91.24	6.27%	99.50%	96.82	11.34%	99.70%	98.11	16.12%
<i>Hosoda</i>	99.00%	90.05	3.38%	99.60%	95.92	7.06%	99.80%	96.82	8.96%
<i>Paprika</i>	99.60%	94.23	8.56%	100.00%	97.21	14.93%	100.00%	98.01	18.51%
Overall	99.17%	92.95	4.94%	99.81%	96.87	9.88%	99.89%	97.97	12.92%

Table 4. Results for the intra set experiment. The network is trained and evaluated on Set 4. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 4	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Black Hair</i>	96.00%	86.00%	29.00%	99.00%	92.00%	51.00%	99.00%	9458.00%.00%	61.00%
<i>Blonde Hair</i>	96.00%	58.00%	26.00%	99.00%	70.00%	41.00%	99.00%	74.00%	56.00%
<i>Brown Hair</i>	68.00%	51.00%	27.00%	77.00%	61.00%	40.00%	86.00%	66.00%	49.00%
<i>Gender</i>	98.00%	80.00%	33.00%	99.00%	88.00%	63.00%	100.00%	92.00%	71.00%
<i>Aged</i>	95.00%	83.00%	46.00%	98.00%	89.00%	61.00%	99.00%	89.00%	70.00%
Overall	90.60%	76.29%	32.20%	94.40%	83.31%	51.20%	96.60%	85.81%	61.40%

Table 5. Results for the inter set experiment. The network is trained on Set 1 and evaluated on Set 2. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 2	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	98.98%	72.84%	33.86%	99.93%	84.78%	40.02%	100.00%	89.03%	43.68%
<i>Scaling</i>	98.81%	99.38%	83.66%	99.80%	99.95%	89.63%	99.93%	100.00%	91.32%
<i>Translation</i>	95.90%	98.83%	96.84%	99.48%	99.83%	98.86%	99.88%	99.88%	99.20%
<i>Rotation</i>	99.20%	97.76%	71.62%	99.93%	99.88%	83.66%	100.00%	99.98%	87.39%
<i>Salt & Pepper Noise</i>	99.85%	99.95%	92.29%	99.98%	100.00%	96.54%	100.00%	100.00%	97.74%
<i>Gamma Correction</i>	83.63%	77.21%	0.67%	94.03%	89.55%	1.39%	96.92%	93.78%	2.24%
<i>Blurring</i>	98.68%	99.88%	94.63%	99.68%	99.98%	97.16%	99.90%	100.00%	97.79%
<i>Shearing</i>	100.00%	100.00%	87.69%	100.00%	100.00%	93.76%	100.00%	100.00%	95.32%
<i>Perspective Transform</i>	98.76%	99.10%	86.77%	100.00%	99.80%	92.99%	100.00%	100.00%	94.43%
<i>Warping</i>	100.00%	99.93%	98.76%	100.00%	100.00%	99.65%	100.00%	100.00%	99.78%
<i>Filters</i>	54.55%	66.19%	33.48%	71.62%	79.38%	47.61%	78.81%	84.23%	53.51%
Overall	93.49%	91.92%	70.93%	96.77%	95.74%	76.48%	97.77%	96.99%	78.40%

Table 6. Results for the inter set experiment. The network is trained on Set 1 and evaluated on Set 3. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 3	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
Cycle GAN									
<i>Van-gogh</i>	3.58%	8.96%	5.07%	9.55%	17.71%	10.75%	13.13%	22.39%	14.03%
<i>Monet</i>	5.07%	9.05%	3.78%	10.75%	17.31%	8.26%	13.73%	22.69%	11.14%
<i>Ukiyoe</i>	0.20%	1.09%	0.70%	0.80%	2.19%	2.69%	1.69%	3.28%	3.98%
<i>Cezanna</i>	2.49%	6.77%	4.08%	7.06%	14.03%	8.46%	10.65%	18.51%	11.74%
Cartoon GAN									
<i>Shinkai</i>	4.08%	12.84%	7.76%	10.15%	22.19%	15.32%	13.83%	27.46%	18.81%
<i>Hayao</i>	8.06%	22.69%	6.27%	17.21%	33.73%	11.34%	22.19%	40.10%	16.12%
<i>Hosoda</i>	3.38%	10.85%	3.38%	8.36%	20.10%	7.06%	12.64%	24.98%	8.96%
<i>Paprika</i>	6.97%	16.72%	8.56%	14.73%	27.46%	14.93%	20.20%	33.63%	18.51%
Overall	14.86%	37.23%	4.94%	44.91%	28.30%	9.88%	23.11%	32.55%	12.92%

Table 7. Results for the inter set experiment. The network is trained on Set 1 and evaluated on Set 4. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 4	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Black Hair</i>	18.00%	29.00%	29.00%	43.00%	51.00%	51.00%	53.00%	64.00%	61.00%
<i>Blonde Hair</i>	10.00%	20.00%	26.00%	32.00%	47.00%	41.00%	48.00%	56.00%	56.00%
<i>Brown Hair</i>	11.00%	15.00%	27.00%	28.00%	33.00%	40.00%	39.00%	39.00%	49.00%
<i>Gender</i>	21.00%	31.00%	33.00%	31.00%	47.00%	63.00%	44.00%	58.00%	71.00%
<i>Age</i>	23.00%	29.00%	46.00%	36.00%	56.00%	61.00%	51.00%	63.00%	70.00%
Overall	30.38%	37.23%	32.20%	44.91%	55.59%	51.20%	55.76%	63.27%	61.40%

Table 8. Results for the inter set experiment. The network is trained on Set 2 and evaluated on Set 1. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 1	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	90.52%	48.73%	29.26%	96.57%	58.19%	32.61%	97.93%	62.43%	34.52%
<i>Scaling</i>	91.24%	76.70%	61.36%	96.40%	87.09%	71.68%	97.69%	89.95%	74.89%
<i>Translation</i>	79.27%	72.25%	85.06%	89.05%	87.41%	91.88%	92.06%	91.47%	93.60%
<i>Rotation</i>	77.74%	68.59%	35.28%	88.51%	84.42%	50.19%	91.73%	89.56%	56.16%
<i>Salt & Pepper Noise</i>	99.61%	89.65%	88.60%	99.94%	94.31%	93.64%	99.97%	95.85%	94.95%
<i>Gamma Correction</i>	86.61%	3.72%	0.12%	93.19%	8.00%	0.38%	95.17%	10.99%	0.55%
<i>Blurring</i>	98.34%	90.97%	89.92%	99.07%	95.53%	94.21%	99.33%	96.79%	95.33%
<i>Shearing</i>	99.89%	99.06%	86.75%	100.00%	99.82%	92.36%	100.00%	99.92%	93.91%
<i>Perspective Transform</i>	88.74%	68.99%	77.81%	95.59%	81.93%	86.62%	97.42%	86.44%	89.10%
<i>Warping</i>	99.91%	99.31%	94.10%	99.99%	99.90%	96.93%	100.00%	99.95%	97.58%
<i>Filters</i>	87.63%	11.65%	19.67%	92.74%	19.79%	31.76%	94.24%	24.26%	36.97%
Overall	90.86%	66.43%	60.72%	95.55%	74.22%	67.48%	96.87%	77.05%	69.78%

Table 9. Results for the inter set experiment. The network is trained on Set 2 and evaluated on Set 3. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 3	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
Cycle GAN									
<i>Van-gogh</i>	42.69%	9.95%	5.07%	55.82%	19.70%	10.75%	60.30%	25.87%	14.03%
<i>Monet</i>	32.74%	6.07%	3.78%	46.57%	10.75%	8.26%	52.04%	14.33%	11.14%
<i>Ukiyoe</i>	12.94%	0.10%	0.70%	23.78%	0.40%	2.69%	29.95%	0.70%	3.98%
<i>Cezanna</i>	40.60%	8.26%	4.08%	54.93%	15.72%	8.46%	61.49%	21.09%	11.74%
Cartoon GAN									
<i>Shinkai</i>	41.59%	8.56%	7.76%	54.93%	14.23%	15.32%	61.79%	18.71%	18.81%
<i>Hayao</i>	42.49%	9.85%	6.27%	52.04%	19.30%	11.34%	56.92%	24.68%	16.12%
<i>Hosoda</i>	37.61%	6.07%	3.38%	50.15%	11.34%	7.06%	56.62%	13.53%	8.96%
<i>Paprika</i>	37.91%	7.56%	8.56%	50.75%	15.12%	14.93%	56.12%	18.51%	18.51%
Overall	36.06%	17.37%	4.94%	48.62%	22.94%	9.88%	54.40%	26.37%	12.92%

Table 10. Results for the inter set experiment. The network is trained on Set 2 and evaluated on Set 4. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 4	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Black Hair</i>	28.00%	39.00%	29.00%	49.00%	57.00%	51.00%	63.00%	71.00%	61.00%
<i>Blonde Hair</i>	17.00%	24.00%	26.00%	42.00%	39.00%	41.00%	53.00%	51.00%	56.00%
<i>Brown Hair</i>	15.00%	11.00%	27.00%	29.00%	25.00%	40.00%	42.00%	33.00%	49.00%
<i>Gender</i>	28.00%	35.00%	33.00%	53.00%	58.00%	63.00%	59.00%	69.00%	71.00%
<i>Aged</i>	31.00%	26.00%	46.00%	54.00%	49.00%	61.00%	67.00%	62.00%	70.00%
Overall	23.80%	39.07%	32.20%	45.40%	54.59%	51.20%	83.52%	64.27%	61.40%

Table 11. Results for the inter set experiment. The network is trained on Set 3 and evaluated on Set 1. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 1	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	27.35%	29.28%	29.26%	29.19%	32.11%	32.61%	30.43%	33.49%	34.52%
<i>Scaling</i>	72.94%	66.59%	61.36%	84.02%	74.05%	71.68%	88.23%	76.73%	74.89%
<i>Translation</i>	29.85%	38.92%	85.06%	47.15%	53.76%	91.88%	54.72%	59.63%	93.60%
<i>Rotation</i>	15.45%	23.03%	35.28%	28.61%	35.41%	50.19%	34.57%	40.68%	56.16%
<i>Salt & Pepper Noise</i>	99.71%	98.71%	88.60%	99.94%	99.43%	93.64%	99.96%	99.57%	94.95%
<i>Gamma Correction</i>	92.71%	33.59%	0.12%	95.83%	43.70%	0.38%	96.68%	48.15%	0.55%
<i>Blurring</i>	99.95%	99.39%	89.92%	100.00%	99.83%	94.21%	100.00%	99.89%	95.33%
<i>Shearing</i>	99.92%	99.24%	86.75%	100.00%	99.91%	92.36%	100.00%	99.96%	93.91%
<i>Perspective Transform</i>	51.73%	53.33%	77.81%	55.16%	57.65%	86.62%	57.65%	59.94%	89.10%
<i>Warping</i>	88.83%	89.17%	94.10%	97.17%	96.17%	96.93%	98.68%	97.59%	97.58%
<i>Filters</i>	99.80%	91.35%	19.67%	99.93%	94.64%	31.76%	99.97%	95.70%	36.97%
Overall	70.75%	65.69%	60.72%	76.09%	71.51%	67.48%	78.26%	73.76%	69.78%

Table 12. Results for the inter set experiment. The network is trained on Set 3 and evaluated on Set 2. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 2	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	30.02%	32.71%	33.86%	34.95%	37.91%	40.02%	37.36%	40.87%	43.68%
<i>Scaling</i>	85.05%	74.83%	83.66%	95.20%	81.59%	89.63%	97.36%	84.93%	91.32%
<i>Translation</i>	50.52%	55.42%	96.84%	71.59%	72.11%	98.86%	79.33%	78.46%	99.20%
<i>Rotation</i>	29.73%	36.34%	71.62%	46.92%	51.24%	83.66%	52.46%	56.94%	87.39%
<i>Salt & Pepper Noise</i>	99.93%	99.53%	92.29%	99.98%	99.90%	96.54%	99.98%	99.93%	97.74%
<i>Gamma Correction</i>	96.47%	45.02%	0.67%	98.61%	58.11%	1.39%	99.23%	63.51%	2.24%
<i>Blurring</i>	100.00%	99.90%	94.63%	100.00%	100.00%	97.16%	100.00%	100.00%	97.79%
<i>Shearing</i>	100.00%	99.85%	87.69%	100.00%	99.98%	93.76%	100.00%	99.98%	95.32%
<i>Perspective Transform</i>	56.77%	58.26%	86.77%	67.46%	66.39%	92.99%	74.35%	70.97%	94.43%
<i>Warping</i>	96.72%	95.47%	98.76%	99.70%	99.28%	99.65%	99.85%	99.53%	99.78%
<i>Filters</i>	99.95%	94.85%	33.48%	100.00%	97.56%	47.61%	100.00%	98.38%	53.51%
Overall	76.83%	72.02%	70.93%	83.13%	78.55%	76.48%	85.45%	81.23%	78.40%

Table 13. Results for the inter set experiment. The network is trained on Set 2 and evaluated on Set 4. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 4	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Black Hair</i>	98.00%	92.00%	29.00%	99.00%	98.00%	51.00%	100.00%	99.00%	61.00%
<i>Blonde Hair</i>	100.00%	88.00%	26.00%	100.00%	97.00%	41.00%	100.00%	99.00%	56.00%
<i>Brown Hair</i>	93.00%	92.00%	27.00%	97.00%	97.00%	40.00%	99.00%	98.00%	49.00%
<i>Gender</i>	100.00%	97.00%	33.00%	100.00%	99.00%	63.00%	100.00%	99.00%	71.00%
<i>Aged</i>	100.00%	94.00%	46.00%	100.00%	98.00%	61.00%	100.00%	99.00%	70.00%
Overall	98.20%	93.82%	32.20%	99.20%	98.16%	51.20%	99.80%	99.00%	61.40%

Table 14. Results for the inter set experiment. The network is trained on Set 4 and evaluated on Set 1. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 1	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	28.55%	31.38%	29.26%	31.20%	35.84%	32.61%	32.68%	38.15%	34.52%
<i>Scaling</i>	60.21%	75.93%	61.36%	68.99%	85.17%	71.68%	72.53%	88.44%	74.89%
<i>Translation</i>	31.97%	70.24%	85.06%	47.64%	86.03%	91.88%	54.40%	90.50%	93.60%
<i>Rotation</i>	16.80%	37.95%	35.28%	27.82%	54.31%	50.19%	33.26%	60.90%	56.16%
<i>Salt & Pepper Noise</i>	78.61%	58.74%	88.60%	84.65%	65.96%	93.64%	86.86%	68.92%	94.95%
<i>Gamma Correction</i>	46.89%	11.96%	0.12%	57.26%	18.33%	0.38%	61.46%	21.56%	0.55%
<i>Blurring</i>	85.46%	52.06%	89.92%	90.88%	63.62%	94.21%	92.72%	68.22%	95.33%
<i>Shearing</i>	98.74%	99.53%	86.75%	99.72%	99.92%	92.36%	99.82%	99.97%	93.91%
<i>Perspective Transform</i>	55.09%	60.27%	77.81%	60.99%	69.96%	86.62%	63.86%	74.20%	89.10%
<i>Warping</i>	79.47%	98.42%	94.10%	89.78%	99.79%	96.93%	92.75%	99.89%	97.58%
<i>Filters</i>	95.27%	63.57%	19.67%	97.50%	73.21%	31.76%	98.22%	76.77%	36.97%
Overall	61.55%	60.00%	60.72%	68.77%	68.38%	67.48%	71.69%	71.59%	69.78%

Table 15. Results for the inter set experiment. The network is trained on Set 4 and evaluated on Set 2. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 2	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Flipping</i>	32.36%	37.31%	33.86%	37.89%	46.42%	40.02%	41.39%	50.47%	43.68%
<i>Scaling</i>	70.62%	85.97%	83.66%	80.87%	93.88%	89.63%	85.30%	96.07%	91.32%
<i>Translation</i>	51.79%	86.77%	96.84%	70.37%	96.44%	98.86%	76.54%	98.18%	99.20%
<i>Rotation</i>	30.42%	56.69%	71.62%	47.29%	76.52%	83.66%	54.65%	83.13%	87.39%
<i>Salt & Pepper Noise</i>	85.35%	66.29%	92.29%	91.64%	75.67%	96.54%	93.28%	79.78%	97.74%
<i>Gamma Correction</i>	58.51%	19.80%	0.67%	71.02%	31.27%	1.39%	77.06%	36.54%	2.24%
<i>Blurring</i>	91.89%	65.20%	94.63%	96.39%	78.76%	97.16%	97.59%	84.10%	97.79%
<i>Shearing</i>	99.63%	99.90%	87.69%	99.98%	100.00%	93.76%	100.00%	100.00%	95.32%
<i>Perspective Transform</i>	61.99%	72.79%	86.77%	72.89%	85.12%	92.99%	77.34%	89.30%	94.43%
<i>Warping</i>	90.02%	99.70%	98.76%	96.82%	99.98%	99.65%	98.21%	100.00%	99.78%
<i>Filters</i>	98.01%	73.66%	33.48%	99.40%	84.00%	47.61%	99.80%	87.61%	53.51%
Overall	70.05%	69.46%	70.93%	78.60%	78.91%	76.48%	81.92%	82.29%	78.40%

Table 16. Results for the inter set experiment. The network is trained on Set 4 and evaluated on Set 4. The accuracy is computed for the top 1, 5, and 10 closest matches.

SET 3	Recall @1			Recall @5			Recall @10		
<i>Transformations</i>	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram	Triplet Loss	Siamese	Spatial Histogram
<i>Cycle GAN</i>									
<i>Van-gogh</i>	86.37%	43.98%	5.07%	94.13%	61.89%	10.75%	96.32%	67.46%	14.03%
<i>Monet</i>	70.05%	8.36%	3.78%	82.99%	14.93%	8.26%	87.36%	19.30%	11.14%
<i>Ukiyoe</i>	24.78%	4.58%	0.70%	38.41%	8.86%	2.69%	43.28%	10.15%	3.98%
<i>Cezanna</i>	86.17%	35.82%	4.08%	93.53%	51.34%	8.46%	95.62%	57.71%	11.74%
<i>Cartoon GAN</i>									
<i>Shinkai</i>	83.08%	42.59%	7.76%	91.44%	55.62%	15.32%	93.23%	61.29%	18.81%
<i>Hayao</i>	70.05%	29.55%	6.27%	78.01%	41.39%	11.34%	81.19%	45.47%	16.12%
<i>Hosoda</i>	70.25%	30.25%	3.38%	83.08%	39.80%	7.06%	85.77%	43.48%	8.96%
<i>Paprika</i>	74.63%	29.95%	8.56%	82.19%	40.30%	14.93%	85.37%	44.28%	18.51%
Overall	70.67%	36.11%	4.94%	80.47%	46.01%	9.88%	83.52%	49.90%	12.92%