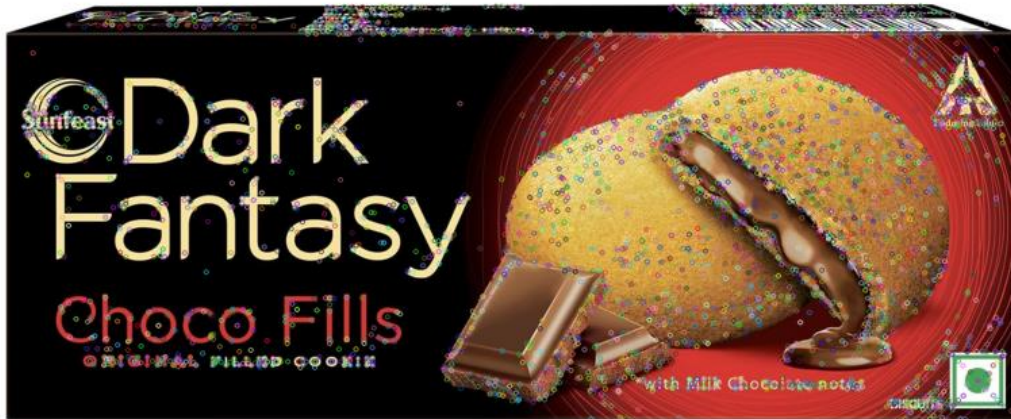


SIFT Keypoints



ORB + BFMatcher - Top 30 Matches



Watershed Contour Detection



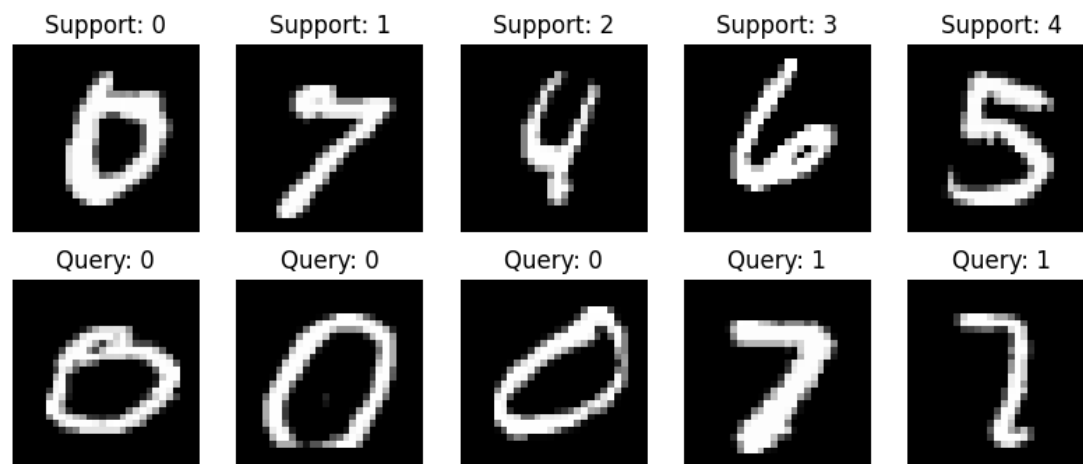
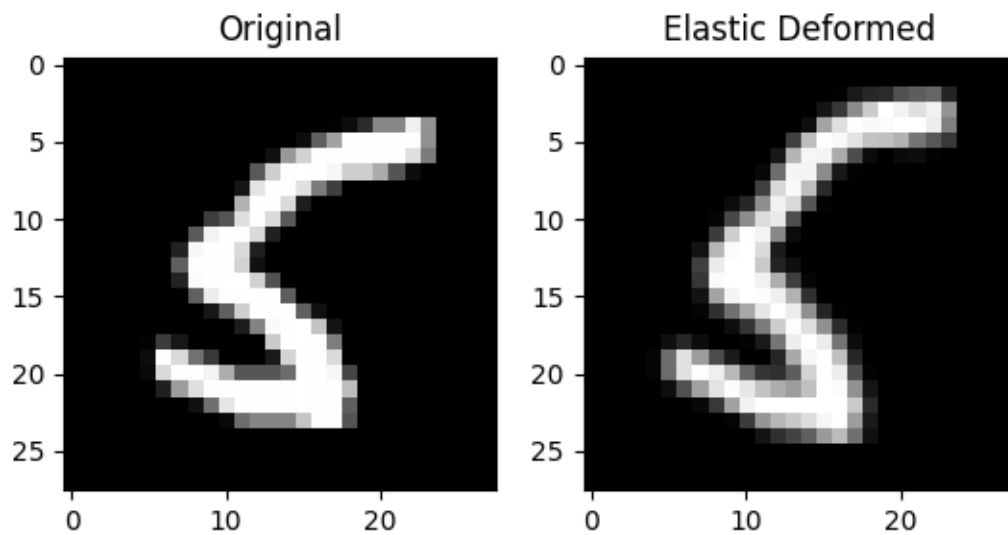
Using device: cpu
C:\Users\chandan\AppData\Roaming\Python\Python312\site-packages\torchvision\models\utils.py:288: UserWarning: The parameter 'pretrained' is deprecated since 0.13 and may be removed in the future, please use 'weights' instead.
warnings.warn(
C:\Users\chandan\AppData\Roaming\Python\Python312\site-packages\torchvision\models\utils.py:223: UserWarning: Arguments other than a weight enum or 'None' for 'weights' are deprecated since 0.13 and may be removed in the future. The current behavior is equivalent to passing 'weights=None'.
warnings.warn(msg)

ResNet-18 Summary:

Layer (type)	Output Shape	Param #
Conv2d-1	[-1, 64, 32, 32]	1,728
BatchNorm2d-2	[-1, 64, 32, 32]	128
ReLU-3	[-1, 64, 32, 32]	0
Identity-4	[-1, 64, 32, 32]	0
Conv2d-5	[-1, 64, 32, 32]	36,864
BatchNorm2d-6	[-1, 64, 32, 32]	128
ReLU-7	[-1, 64, 32, 32]	0
Conv2d-8	[-1, 64, 32, 32]	36,864
BatchNorm2d-9	[-1, 64, 32, 32]	128
ReLU-10	[-1, 64, 32, 32]	0
BasicBlock-11	[-1, 64, 32, 32]	0
Conv2d-12	[-1, 64, 32, 32]	36,864
BatchNorm2d-13	[-1, 64, 32, 32]	128
ReLU-14	[-1, 64, 32, 32]	0
Conv2d-15	[-1, 64, 32, 32]	36,864
BatchNorm2d-16	[-1, 64, 32, 32]	128
ReLU-17	[-1, 64, 32, 32]	0
BasicBlock-18	[-1, 64, 32, 32]	0
Conv2d-19	[-1, 128, 16, 16]	73,728
BatchNorm2d-20	[-1, 128, 16, 16]	256
ReLU-21	[-1, 128, 16, 16]	0
Conv2d-22	[-1, 128, 16, 16]	147,456
BatchNorm2d-23	[-1, 128, 16, 16]	256
Conv2d-24	[-1, 128, 16, 16]	8,192
BatchNorm2d-25	[-1, 128, 16, 16]	256
ReLU-26	[-1, 128, 16, 16]	0
BasicBlock-27	[-1, 128, 16, 16]	0

ResNet-34 Summary:

Layer (type)	Output Shape	Param #
Conv2d-1	[-1, 64, 32, 32]	1,728
BatchNorm2d-2	[-1, 64, 32, 32]	128
ReLU-3	[-1, 64, 32, 32]	0
Identity-4	[-1, 64, 32, 32]	0
Conv2d-5	[-1, 64, 32, 32]	36,864
BatchNorm2d-6	[-1, 64, 32, 32]	128
ReLU-7	[-1, 64, 32, 32]	0
Conv2d-8	[-1, 64, 32, 32]	36,864
BatchNorm2d-9	[-1, 64, 32, 32]	128
ReLU-10	[-1, 64, 32, 32]	0
BasicBlock-11	[-1, 64, 32, 32]	0
Conv2d-12	[-1, 64, 32, 32]	36,864
BatchNorm2d-13	[-1, 64, 32, 32]	128
ReLU-14	[-1, 64, 32, 32]	0
Conv2d-15	[-1, 64, 32, 32]	36,864
BatchNorm2d-16	[-1, 64, 32, 32]	128
ReLU-17	[-1, 64, 32, 32]	0
BasicBlock-18	[-1, 64, 32, 32]	0
Conv2d-19	[-1, 64, 32, 32]	36,864
BatchNorm2d-20	[-1, 64, 32, 32]	128
ReLU-21	[-1, 64, 32, 32]	0
Conv2d-22	[-1, 64, 32, 32]	36,864
BatchNorm2d-23	[-1, 64, 32, 32]	128
ReLU-24	[-1, 64, 32, 32]	0
BasicBlock-25	[-1, 64, 32, 32]	0
Conv2d-26	[-1, 128, 16, 16]	73,728
BatchNorm2d-27	[-1, 128, 16, 16]	256
ReLU-28	[-1, 128, 16, 16]	0
Conv2d-29	[-1, 128, 16, 16]	147,456
BatchNorm2d-30	[-1, 128, 16, 16]	256
Conv2d-31	[-1, 128, 16, 16]	8,192
BatchNorm2d-32	[-1, 128, 16, 16]	256
ReLU-33	[-1, 128, 16, 16]	0
BasicBlock-34	[-1, 128, 16, 16]	0
Conv2d-35	[-1, 128, 16, 16]	147,456



```
[50/300] Loss: 1.4984, Acc: 0.4000
[100/300] Loss: 1.3331, Acc: 0.6000
[150/300] Loss: 1.4281, Acc: 0.6000
[200/300] Loss: 1.3713, Acc: 0.8000
[250/300] Loss: 1.3983, Acc: 0.6000
[300/300] Loss: 1.2832, Acc: 0.8000
[1/10] Siamese Loss: 0.6893
[2/10] Siamese Loss: 0.6763
[3/10] Siamese Loss: 0.6649
[4/10] Siamese Loss: 0.6505
[5/10] Siamese Loss: 0.6437
[6/10] Siamese Loss: 0.6383
[7/10] Siamese Loss: 0.6372
[8/10] Siamese Loss: 0.6313
[9/10] Siamese Loss: 0.6287
[10/10] Siamese Loss: 0.6238

--- Matching Network Performance ---
Accuracy: 0.6080
Precision: 0.6117
Recall: 0.6080
F1-Score: 0.6083

--- Siamese Network Performance ---
Accuracy: 0.7260
Precision: 0.8143
Recall: 0.7260
F1-Score: 0.7053

Matching Network with less data - Accuracy: 0.6040
```