

Time

Log Message

6.3s 0 0.00s - Debugger warning: It seems that frozen modules are being used, which may
6.3s 1 0.00s - make the debugger miss breakpoints. Please pass -Xfrozen_modules=off
6.3s 2 0.00s - to python to disable frozen modules.
6.3s 3 0.00s - Note: Debugging will proceed. Set PYDEVD_DISABLE_FILE_VALIDATION=1 to disable this validation.
6.8s 4 0.00s - Debugger warning: It seems that frozen modules are being used, which may
6.8s 5 0.00s - make the debugger miss breakpoints. Please pass -Xfrozen_modules=off
6.8s 6 0.00s - to python to disable frozen modules.
6.8s 7 0.00s - Note: Debugging will proceed. Set PYDEVD_DISABLE_FILE_VALIDATION=1 to disable this validation.
20.0s 8 Using device: cuda
20.0s 9
20.3s 10 Dataset downloaded to: /kaggle/input/asl-alphabet
20.3s 11
20.3s 12 Training path: /kaggle/input/asl-alphabet/asl_alphabet_train/asl_alphabet_train
20.3s 13 Test path: /kaggle/input/asl-alphabet/asl_alphabet_test/asl_alphabet_test
20.3s 14
160.4s 15 ✓ Training set loaded: 87000 images
160.4s 16 ✓ Number of classes: 29
160.4s 17 ✓ Classes: ['A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z', 'del', 'nothing', 'space']
160.4s 18
160.4s 19 ✓ Train/Val split created:
160.4s 20 Train: 69600 images
160.4s 21 Val: 17400 images
160.4s 22
160.4s 23 ======
160.4s 24 DATA AUGMENTATION STRATEGY
160.4s 25 ======
160.4s 26
160.4s 27 Training Set Augmentations:
160.4s 28 1. Geometric:
160.4s 29 - Random horizontal flip (50%)
160.4s 30 - Random rotation ($\pm 15^\circ$)
160.4s 31 - Random translation ($\pm 10\%$)
160.4s 32
160.4s 33 2. Color/Brightness:
160.4s 34 - Brightness ($\pm 30\%$)
160.4s 35 - Contrast ($\pm 30\%$)
160.4s 36 - Saturation ($\pm 20\%$)
160.4s 37 - Hue ($\pm 10\%$)
160.4s 38
160.4s 39 3. Blur: Gaussian blur for camera simulation
160.4s 40
160.4s 41 Validation & Test: No augmentation (consistent evaluation)
160.4s 42
160.4s 43 ======
160.4s 44
229.6s 45 Found 28 test images
229.6s 46 ✓ Test set loaded: 28 images
229.6s 47
229.6s 48 ======
229.6s 49 HYPERPARAMETER CONFIGURATION
229.6s 50 ======
229.6s 51
229.6s 52 T-A:
229.6s 53 num_epochs : 5
229.6s 54 batch_size : 128
229.6s 55 lr : 0.01
229.6s 56 weight_decay : 1e-05

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229.6s 57      optimizer : Adam
229.6s 58
229.6s 59      T-B:
229.6s 60      num_epochs : 5
229.6s 61      batch_size : 64
229.6s 62      lr : 0.0005
229.6s 63      weight_decay : 0.0001
229.6s 64      optimizer : Adam
229.6s 65
229.6s 66      T-C:
229.6s 67      num_epochs : 5
229.6s 68      batch_size : 64
229.6s 69      lr : 0.0001
229.6s 70      weight_decay : 0.0001
229.6s 71      optimizer : Adam
229.6s 72
229.6s 73      S-A:
229.6s 74      num_epochs : 5
229.6s 75      batch_size : 32
229.6s 76      lr : 0.001
229.6s 77      weight_decay : 0.0001
229.6s 78      optimizer : SGD
229.6s 79
229.8s 80 =====
229.8s 81 TRAINING: T-A (Head Only)
229.8s 82 =====
229.8s 83 LR=0.01, BatchSize=128, Optimizer=Adam, Epochs=5
229.8s 84
303.9s 85      Downloading: "https://download.pytorch.org/models/resnet18-f37072fd.pth" to
/root/.cache/torch/hub/checkpoints/resnet18-f37072fd.pth
303.9s 86
303.9s 87      Downloading: "https://download.pytorch.org/models/resnet18-f37072fd.pth" to
/root/.cache/torch/hub/checkpoints/resnet18-f37072fd.pth
303.9s 88
0%|          | 0.00/44.7M [00:00<?, ?B/s]
304.0s 89
0%|          | 0.00/44.7M [00:00<?, ?B/s]
16%|[██████]  | 7.12M/44.7M [00:00<00:00, 74.2MB/s]
304.1s 90
16%|[██████]  | 7.12M/44.7M [00:00<00:00, 74.2MB/s]
57%|[██████████] | 25.2M/44.7M [00:00<00:00, 142MB/s]
304.2s 91
57%|[██████████] | 25.2M/44.7M [00:00<00:00, 142MB/s]
97%|[███████████] | 43.2M/44.7M [00:00<00:00, 163MB/s]
304.2s 92
97%|[███████████] | 43.2M/44.7M [00:00<00:00, 163MB/s]
100%|[███████████] | 44.7M/44.7M [00:00<00:00, 152MB/s]
304.3s 93
100%|[███████████] | 44.7M/44.7M [00:00<00:00, 152MB/s]
304.3s 94
304.3s 95
304.5s 96      ✓ Created ResNet-18 with ImageNet weights
304.5s 97      Policy T-A: 14,877 / 11,191,389 parameters trainable
944.7s 98      [T-A] Epoch 01/05 | Train Loss: 1.1893, Acc: 0.6616, F1: 0.6604 | Val Loss: 0.6347, Acc: 0.7940, F1: 0.7920
1426.7s 99      [T-A] Epoch 02/05 | Train Loss: 0.7789, Acc: 0.7566, F1: 0.7562 | Val Loss: 0.6477, Acc: 0.7903, F1: 0.7886
1906.2s 100     [T-A] Epoch 03/05 | Train Loss: 0.7453, Acc: 0.7699, F1: 0.7695 | Val Loss: 0.6779, Acc: 0.7841, F1: 0.7825
2391.4s 101     [T-A] Epoch 04/05 | Train Loss: 0.7525, Acc: 0.7730, F1: 0.7727 | Val Loss: 0.4674, Acc: 0.8451, F1: 0.8450
2880.9s 102     [T-A] Epoch 05/05 | Train Loss: 0.7066, Acc: 0.7885, F1: 0.7883 | Val Loss: 0.5344, Acc: 0.8228, F1: 0.8225
2880.9s 103
2880.9s 104     [T-A] Best val macro-F1: 0.8450
2880.9s 105

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2880.9s 106     ✓ Saved T-A checkpoint
2880.9s 107
2881.1s 108 =====
2881.1s 109 TRAINING: T-B (Last Block + Head)
2881.1s 110 =====
2881.1s 111 LR=0.0005, BatchSize=64, Optimizer=Adam, Epochs=5
2881.1s 112
2949.0s 113     ✓ Created ResNet-18 with ImageNet weights
2949.0s 114 Policy T-B: 8,408,605 / 11,191,389 parameters trainable
3437.3s 115 [T-B] Epoch 01/05 | Train Loss: 0.1386, Acc: 0.9634, F1: 0.9634 | Val Loss: 0.0239, Acc: 0.9924, F1: 0.9924
6.3s 116 0.00s - Debugger warning: It seems that frozen modules are being used, which may
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/root/.cache/torch/hub/checkpoints/resnet18-f37072fd.pth
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303.9s 127
304.0s 128
304.1s 129
304.2s 130
304.2s 131
304.3s 132
304.3s 133
304.3s 134
11278.1s 135     /usr/local/lib/python3.11/dist-packages/traitlets/traitlets.py:2915: FutureWarning:
--Exporter.preprocessors=['remove_papermill_header.RemovePapermillHeader'] for containers is deprecated in traitlets 5.0. You
can pass '--Exporter.preprocessors item' ... multiple times to add items to a list.
11278.1s 136     warn(
11278.1s 137     [NbConvertApp] Converting notebook __notebook__.ipynb to notebook
11278.4s 138     [NbConvertApp] Writing 469372 bytes to __notebook__.ipynb
11280.9s 139     /usr/local/lib/python3.11/dist-packages/traitlets/traitlets.py:2915: FutureWarning:
--Exporter.preprocessors=['nbconvert.preprocessors.ExtractOutputPreprocessor'] for containers is deprecated in traitlets 5.0. You
can pass '--Exporter.preprocessors item' ... multiple times to add items to a list.
11280.9s 140     warn(
11281.0s 141     [NbConvertApp] Converting notebook __notebook__.ipynb to html
11281.8s 142     [NbConvertApp] Support files will be in __results__files/
11281.8s 143     [NbConvertApp] Making directory __results__files
11281.8s 144     [NbConvertApp] Making directory __results__files
11281.8s 145     [NbConvertApp] Making directory __results__files
11281.8s 146     [NbConvertApp] Writing 477437 bytes to __results__.html
20.0s 147     Using device: cuda
20.0s 148
20.3s 149     Dataset downloaded to: /kaggle/input/asl-alphabet
20.3s 150

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20.3s 151 Training path: /kaggle/input/asl-alphabet/asl_alphabet_train/asl_alphabet_train
20.3s 152 Test path: /kaggle/input/asl-alphabet/asl_alphabet_test/asl_alphabet_test
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160.4s 157
160.4s 158 ✓ Train/Val split created:
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160.4s 161
160.4s 162 =====
160.4s 163 DATA AUGMENTATION STRATEGY
160.4s 164 =====
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160.4s 166 Training Set Augmentations:
160.4s 167     1. Geometric:
160.4s 168         - Random horizontal flip (50%)
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160.4s 171
160.4s 172     2. Color/Brightness:
160.4s 173         - Brightness ( $\pm 30\%$ )
160.4s 174         - Contrast ( $\pm 30\%$ )
160.4s 175         - Saturation ( $\pm 20\%$ )
160.4s 176         - Hue ( $\pm 10\%$ )
160.4s 177
160.4s 178     3. Blur: Gaussian blur for camera simulation
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160.4s 180 Validation & Test: No augmentation (consistent evaluation)
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160.4s 182 =====
160.4s 183
229.6s 184 Found 28 test images
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229.6s 186
229.6s 187 =====
229.6s 188 HYPERPARAMETER CONFIGURATION
229.6s 189 =====
229.6s 190
229.6s 191 T-A:
229.6s 192     num_epochs : 5
229.6s 193     batch_size  : 128
229.6s 194     lr          : 0.01
229.6s 195     weight_decay : 1e-05
229.6s 196     optimizer   : Adam
229.6s 197
229.6s 198 T-B:
229.6s 199     num_epochs : 5
229.6s 200     batch_size  : 64
229.6s 201     lr          : 0.0005
229.6s 202     weight_decay : 0.0001
229.6s 203     optimizer   : Adam
229.6s 204
229.6s 205 T-C:
229.6s 206     num_epochs : 5
229.6s 207     batch_size  : 64
229.6s 208     lr          : 0.0001
229.6s 209     weight_decay : 0.0001
229.6s 210     optimizer   : Adam
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229.6s 211
229.6s 212 S-A:
229.6s 213     num_epochs : 5
229.6s 214     batch_size : 32
229.6s 215     lr       : 0.001
229.6s 216     weight_decay : 0.0001
229.6s 217     optimizer   : SGD
229.6s 218
229.8s 219 =====
229.8s 220 TRAINING: T-A (Head Only)
229.8s 221 =====
229.8s 222 LR=0.01, BatchSize=128, Optimizer=Adam, Epochs=5
229.8s 223
304.5s 224     ✓ Created ResNet-18 with ImageNet weights
304.5s 225 Policy T-A: 14,877 / 11,191,389 parameters trainable
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2880.9s 231
2880.9s 232 [T-A] Best val macro-F1: 0.8450
2880.9s 233
2880.9s 234     ✓ Saved T-A checkpoint
2880.9s 235
2881.1s 236 =====
2881.1s 237 TRAINING: T-B (Last Block + Head)
2881.1s 238 =====
2881.1s 239 LR=0.0005, BatchSize=64, Optimizer=Adam, Epochs=5
2881.1s 240
2949.0s 241     ✓ Created ResNet-18 with ImageNet weights
2949.0s 242 Policy T-B: 8,408,605 / 11,191,389 parameters trainable
3437.3s 243 [T-B] Epoch 01/05 | Train Loss: 0.1386, Acc: 0.9634, F1: 0.9634 | Val Loss: 0.0239, Acc: 0.9924, F1: 0.9924
4117.0s 244 [T-B] Epoch 02/05 | Train Loss: 0.0398, Acc: 0.9879, F1: 0.9879 | Val Loss: 0.0122, Acc: 0.9972, F1: 0.9972
5002.5s 245 [T-B] Epoch 03/05 | Train Loss: 0.0311, Acc: 0.9910, F1: 0.9910 | Val Loss: 0.0174, Acc: 0.9944, F1: 0.9944
5500.2s 246 [T-B] Epoch 04/05 | Train Loss: 0.0274, Acc: 0.9920, F1: 0.9920 | Val Loss: 0.0103, Acc: 0.9963, F1: 0.9963
5981.9s 247 [T-B] Epoch 05/05 | Train Loss: 0.0267, Acc: 0.9925, F1: 0.9925 | Val Loss: 0.0096, Acc: 0.9975, F1: 0.9975
5981.9s 248
5981.9s 249 [T-B] Best val macro-F1: 0.9975
5981.9s 250
5981.9s 251     ✓ Saved T-B checkpoint
5981.9s 252
5981.9s 253 =====
5981.9s 254 TRAINING: T-C (Progressive Unfreezing)
5981.9s 255 =====
5981.9s 256 LR=0.0001, BatchSize=64, Optimizer=Adam, Epochs=5
5981.9s 257
6027.6s 258     ✓ Created ResNet-18 with ImageNet weights
6027.6s 259 Loaded T-B checkpoint from epoch 5 (val F1: 0.9975)
6027.6s 260
6027.6s 261 Policy T-C: 10,508,317 / 11,191,389 parameters trainable
6509.9s 262 [T-C] Epoch 01/05 | Train Loss: 0.0115, Acc: 0.9968, F1: 0.9968 | Val Loss: 0.0011, Acc: 0.9999, F1: 0.9999
7002.6s 263 [T-C] Epoch 02/05 | Train Loss: 0.0070, Acc: 0.9980, F1: 0.9980 | Val Loss: 0.0027, Acc: 0.9993, F1: 0.9993
7492.6s 264 [T-C] Epoch 03/05 | Train Loss: 0.0049, Acc: 0.9988, F1: 0.9988 | Val Loss: 0.0017, Acc: 0.9998, F1: 0.9998
7979.4s 265 [T-C] Epoch 04/05 | Train Loss: 0.0054, Acc: 0.9987, F1: 0.9987 | Val Loss: 0.0007, Acc: 0.9999, F1: 0.9999
8475.0s 266 [T-C] Epoch 05/05 | Train Loss: 0.0057, Acc: 0.9988, F1: 0.9988 | Val Loss: 0.0012, Acc: 0.9998, F1: 0.9998
8475.0s 267
8475.0s 268 [T-C] Best val macro-F1: 0.9999
8475.0s 269
8475.0s 270     ✓ Saved T-C checkpoint
8475.0s 271
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8475.0s 272 ======
8475.0s 273 TRAINING: S-A (Train from Scratch)
======
8475.0s 274 ======
8475.0s 275 LR=0.001, BatchSize=32, Optimizer=SGD, Epochs=5
8475.0s 276
8536.6s 277 ✓ Created ResNet-18 from scratch
8536.6s 278 Policy S-A: 11,191,389 / 11,191,389 parameters trainable
[S-A] Epoch 01/05 | Train Loss: 2.1557, Acc: 0.3599, F1: 0.3528 | Val Loss: 0.7004, Acc: 0.7931, F1: 0.7903
[S-A] Epoch 02/05 | Train Loss: 0.5709, Acc: 0.8237, F1: 0.8232 | Val Loss: 0.1734, Acc: 0.9460, F1: 0.9461
[S-A] Epoch 03/05 | Train Loss: 0.2290, Acc: 0.9323, F1: 0.9323 | Val Loss: 0.0730, Acc: 0.9806, F1: 0.9806
[S-A] Epoch 04/05 | Train Loss: 0.1313, Acc: 0.9623, F1: 0.9623 | Val Loss: 0.0584, Acc: 0.9851, F1: 0.9852
[S-A] Epoch 05/05 | Train Loss: 0.0824, Acc: 0.9769, F1: 0.9769 | Val Loss: 0.0444, Acc: 0.9872, F1: 0.9872
11131.4s 284
11131.4s 285 [S-A] Best val macro-F1: 0.9872
11131.4s 286
11131.4s 287 ✓ Saved S-A checkpoint
11131.4s 288
11131.5s 289 ======
11131.5s 290 ABLATION STUDY: Comparing All 4 Models on Validation Set
======
11131.5s 291
11131.5s 292
11131.6s 293 ✓ Created ResNet-18 with ImageNet weights
11163.0s 294 T-A | Loss: 0.5344 | Acc: 0.8228 | F1: 0.8225
11163.1s 295 ✓ Created ResNet-18 with ImageNet weights
11194.8s 296 T-B | Loss: 0.0096 | Acc: 0.9975 | F1: 0.9975
11194.8s 297 ✓ Created ResNet-18 with ImageNet weights
11227.2s 298 T-C | Loss: 0.0012 | Acc: 0.9998 | F1: 0.9998
11227.2s 299 ✓ Created ResNet-18 from scratch
11258.6s 300 S-A | Loss: 0.0444 | Acc: 0.9872 | F1: 0.9872
11258.6s 301
11258.6s 302 ✓ Best model: T-C (F1: 0.9998)
11258.6s 303
11260.5s 304 ✓ Training curves saved to training_curves.png
11260.5s 305
11260.7s 306 ======
11260.7s 307 EVALUATING BEST MODEL ON ORIGINAL TEST SET (28 IMAGES)
======
11260.7s 308
11260.7s 309
11260.7s 310 ✓ Found checkpoint: T-A
11260.7s 311 ✓ Found checkpoint: T-B
11260.7s 312 ✓ Found checkpoint: T-C
11260.7s 313 ✓ Found checkpoint: S-A
11260.7s 314
11260.7s 315 Using T-C as best model
11260.7s 316
11260.7s 317 Loading checkpoint: checkpoints/resnet18_T-C_best.pth
11260.7s 318
11260.9s 319 ✓ Created ResNet-18 with ImageNet weights
11260.9s 320 Loaded T-C model from epoch 1
11260.9s 321 (Val F1 at checkpoint: 0.9999)
11260.9s 322
11261.9s 323 Test Set Results (T-C):
11261.9s 324 Accuracy: 1.0000
11261.9s 325 Macro-F1: 1.0000
11261.9s 326 Images tested: 28
11261.9s 327 Confusion Matrix shape: (28, 28)
11261.9s 328
11261.9s 329 Individual Test Predictions:

11261.9s 330
11261.9s 331 ✓ CORRECT | File: A_test.jpg | Predicted: A | True: A
11261.9s 332

11261.9s 333	✓ CORRECT	File: C_test.jpg	Predicted: C	True: C
11261.9s 334	✓ CORRECT	File: D_test.jpg	Predicted: D	True: D
11261.9s 335	✓ CORRECT	File: E_test.jpg	Predicted: E	True: E
11261.9s 336	✓ CORRECT	File: F_test.jpg	Predicted: F	True: F
11261.9s 337	✓ CORRECT	File: G_test.jpg	Predicted: G	True: G
11261.9s 338	✓ CORRECT	File: H_test.jpg	Predicted: H	True: H
11261.9s 339	✓ CORRECT	File: I_test.jpg	Predicted: I	True: I
11261.9s 340	✓ CORRECT	File: J_test.jpg	Predicted: J	True: J
11261.9s 341	✓ CORRECT	File: K_test.jpg	Predicted: K	True: K
11261.9s 342	✓ CORRECT	File: L_test.jpg	Predicted: L	True: L
11261.9s 343	✓ CORRECT	File: M_test.jpg	Predicted: M	True: M
11261.9s 344	✓ CORRECT	File: N_test.jpg	Predicted: N	True: N
11261.9s 345	✓ CORRECT	File: O_test.jpg	Predicted: O	True: O
11261.9s 346	✓ CORRECT	File: P_test.jpg	Predicted: P	True: P
11261.9s 347	✓ CORRECT	File: Q_test.jpg	Predicted: Q	True: Q
11261.9s 348	✓ CORRECT	File: R_test.jpg	Predicted: R	True: R
11261.9s 349	✓ CORRECT	File: S_test.jpg	Predicted: S	True: S
11261.9s 350	✓ CORRECT	File: T_test.jpg	Predicted: T	True: T
11261.9s 351	✓ CORRECT	File: U_test.jpg	Predicted: U	True: U
11261.9s 352	✓ CORRECT	File: V_test.jpg	Predicted: V	True: V
11261.9s 353	✓ CORRECT	File: W_test.jpg	Predicted: W	True: W
11261.9s 354	✓ CORRECT	File: X_test.jpg	Predicted: X	True: X
11261.9s 355	✓ CORRECT	File: Y_test.jpg	Predicted: Y	True: Y
11261.9s 356	✓ CORRECT	File: Z_test.jpg	Predicted: Z	True: Z
11261.9s 357	✓ CORRECT	File: nothing_test.jpg	Predicted: nothing	True: nothing
11261.9s 358	✓ CORRECT	File: space_test.jpg	Predicted: space	True: space
11261.9s 359				

11261.9s 360

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Summary: 28/28 correct (100.0%)

11261.9s 362

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✓ Test confusion matrix saved

11264.8s 363

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CUSTOM TEST SET EVALUATION

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11264.9s 364

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11264.9s 365

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11264.9s 366

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11264.9s 367

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11264.9s 368

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11264.9s 369

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11264.9s 370

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11264.9s 371

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11264.9s 372

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11264.9s 373

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'nothing']

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11264.9s 374

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11269.8s 375

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11269.8s 376

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11269.8s 377

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11269.8s 378

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11269.8s 379

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11269.8s 380

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11269.8s 381

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11269.8s 382

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11269.8s 383

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11269.8s 384

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11269.8s 385

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11269.8s 386

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11269.8s 387

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11269.8s 388

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11269.8s 389

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11269.8s 390

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11269.8s 391

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11269.8s 392

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11269.8s 393	✓ L	:	1.0000 (1/1)
11269.8s 394	✗ M	:	0.0000 (0/1)
11269.8s 395	✓ N	:	1.0000 (1/1)
11269.8s 396	✓ O	:	1.0000 (1/1)
11269.8s 397	✓ P	:	1.0000 (1/1)
11269.8s 398	✗ Q	:	0.0000 (0/1)
11269.8s 399	✓ R	:	1.0000 (1/1)
11269.8s 400	✗ S	:	0.0000 (0/1)
11269.8s 401	✗ T	:	0.0000 (0/1)
11269.8s 402	✓ U	:	1.0000 (1/1)
11269.8s 403	✗ V	:	0.0000 (0/1)
11269.8s 404	✗ W	:	0.0000 (0/1)
11269.8s 405	✗ X	:	0.0000 (0/1)
11269.8s 406	✓ Y	:	1.0000 (1/1)
11269.8s 407	✗ Z	:	0.0000 (0/1)
11269.8s 408	✗ nothing	:	0.0000 (0/1)
11269.8s 409	✓ Custom test confusion matrix saved		
11272.6s 410	=====		
11272.6s 411	COMPARISON: Original vs Custom Test Set		
11272.6s 412	=====		
11272.6s 413	Original Test (28 images): Acc=1.0000 F1=1.0000		
11272.6s 414	Custom Test (27 images): Acc=0.5926 F1=0.4943		
11272.6s 415	Difference (Custom - Original):		
11272.6s 416	Accuracy: -0.4074		
11272.6s 417	Macro-F1: -0.5057		
11272.6s 418	⚠ Custom test performs WORSE than original (may indicate overfitting)		
11272.6s 419	=====		
11272.6s 420	FINAL SUMMARY - PHASE 1 COMPLETE		
11272.6s 421	=====		
11272.6s 422	Ablation Study Results (Validation Set):		
11272.6s 423	-----		
11272.6s 424	Policy	Val Loss	Val Acc
11272.6s 425	-----	Val F1	
11272.6s 426	T-A	0.5344	0.8228
11272.6s 427	T-B	0.0096	0.9975
11272.6s 428	T-C	0.0012	0.9998
11272.6s 429	S-A	0.0444	0.9872
11272.6s 430	=====		
11272.6s 431	BEST MODEL: T-C		
11272.6s 432	=====		
11272.6s 433	Val Loss: 0.0012		
11272.6s 434	Val Accuracy: 0.9998		
11272.6s 435	Val Macro-F1: 0.9998		
11272.6s 436	Test Set Performance:		
11272.6s 437	-----		
11272.6s 438	Original Test (28 images):		
11272.6s 439	- Accuracy: 1.0000		
11272.6s 440	- Macro-F1: 1.0000		
11272.6s 441	=====		
11272.6s 442	✓ PHASE 1 COMPLETE - All Models Trained & Evaluated!		
11272.6s 443	=====		
11272.6s 444			
11272.6s 445			
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11272.6s 452			
11272.6s 453			