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A SEED-AUGMENT-TRAIN FRAMEWORK FOR UNIVERSAL DIGIT CLASSIFICATION

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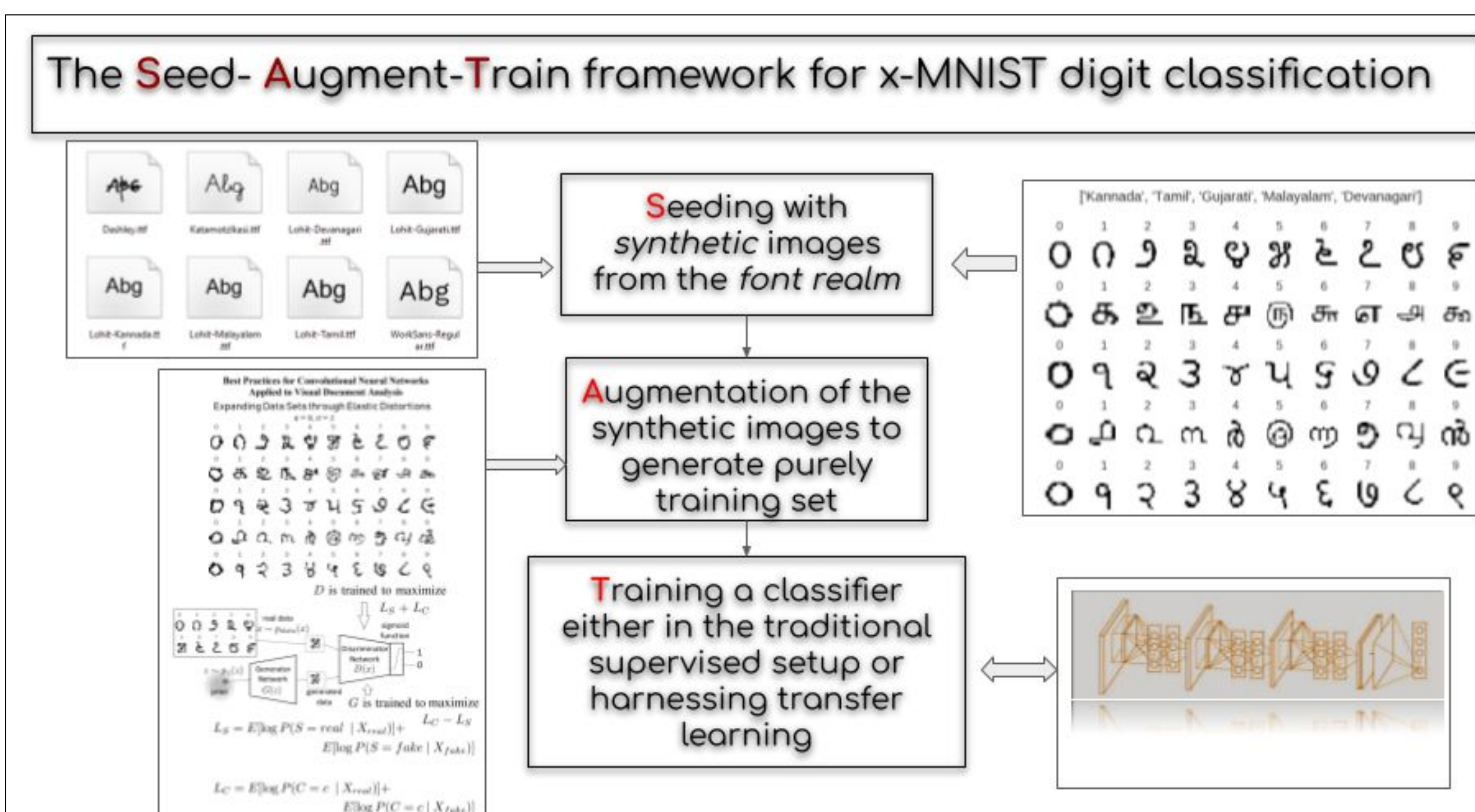
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I: Abstract

In this paper, we propose a **Seed-Augment-Train/Transfer (SAT)** framework that contains a synthetic seed image dataset generation procedure for languages with different numeral systems using freely available open font file datasets. This seed dataset of images is then augmented to create a purely synthetic training dataset, which is in turn used to train a deep neural network and test on held-out real world handwritten digits dataset spanning five Indic scripts, **Kannada, Tamil, Gujarati, Malayalam, and Devanagari**. We showcase the efficacy of this approach both qualitatively, by training a Boundary-seeking GAN (BGAN) that generates realistic digit images in the five languages, and also quantitatively by testing a CNN trained on the synthetic data on the real-world datasets. This establishes not only an interesting nexus between the font-datasets-world and transfer learning but also provides a recipe for universal-digit classification in any script.

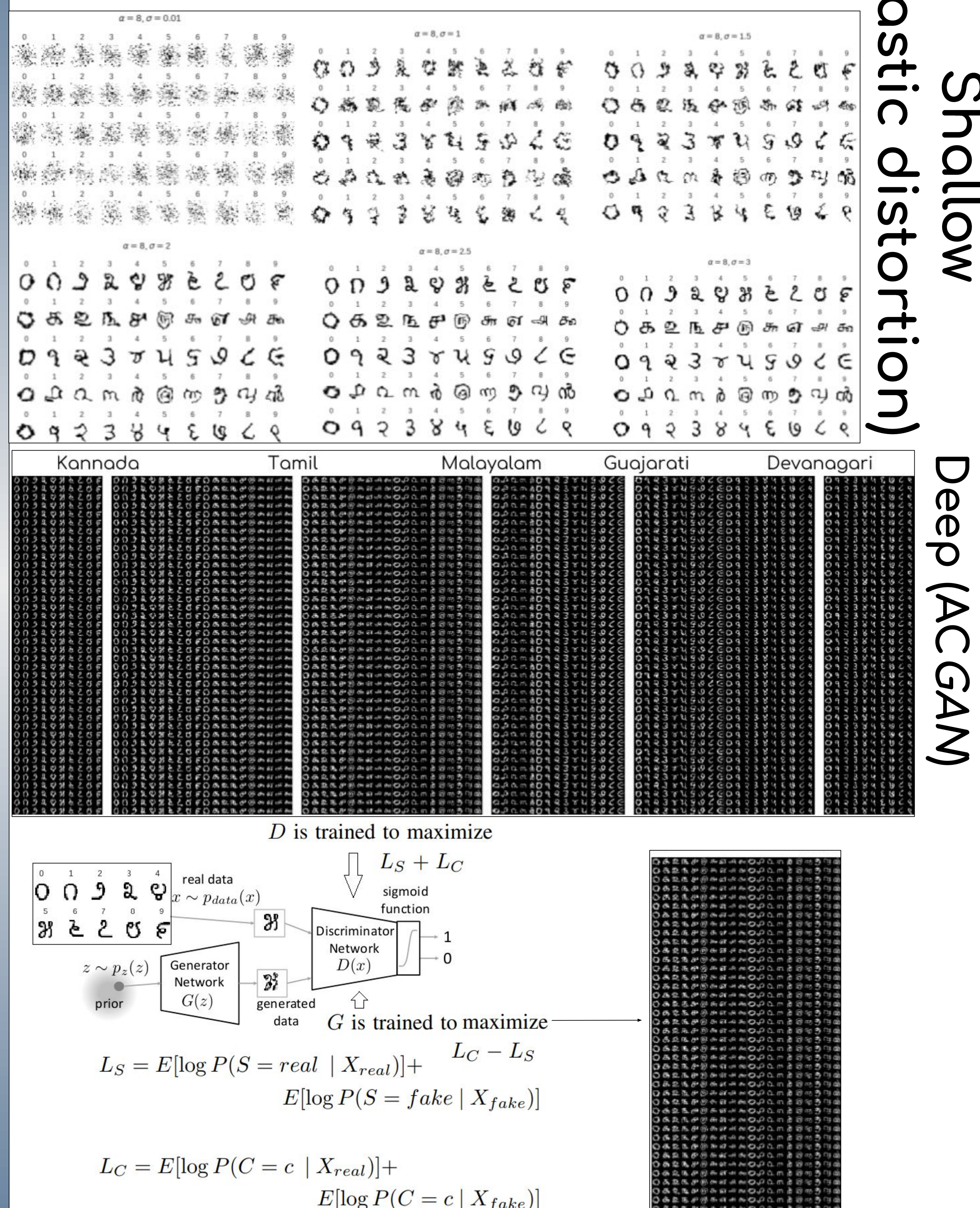
II: SAT framework



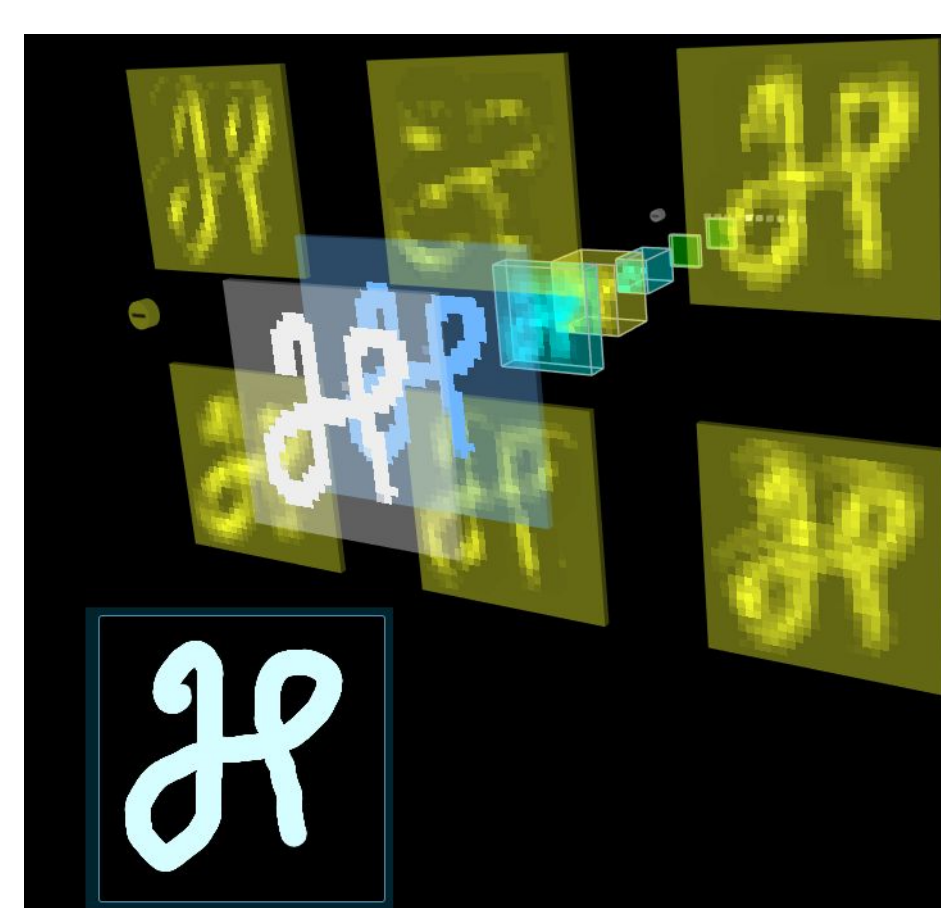
1: Seeding using fonts



2: Augment

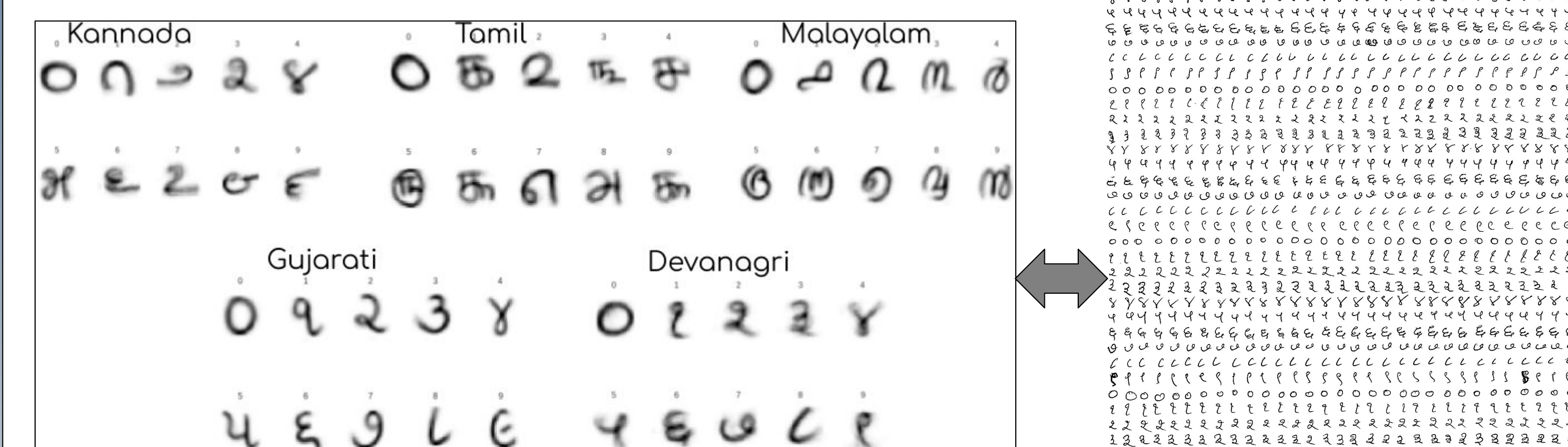


3: Transfer/Train

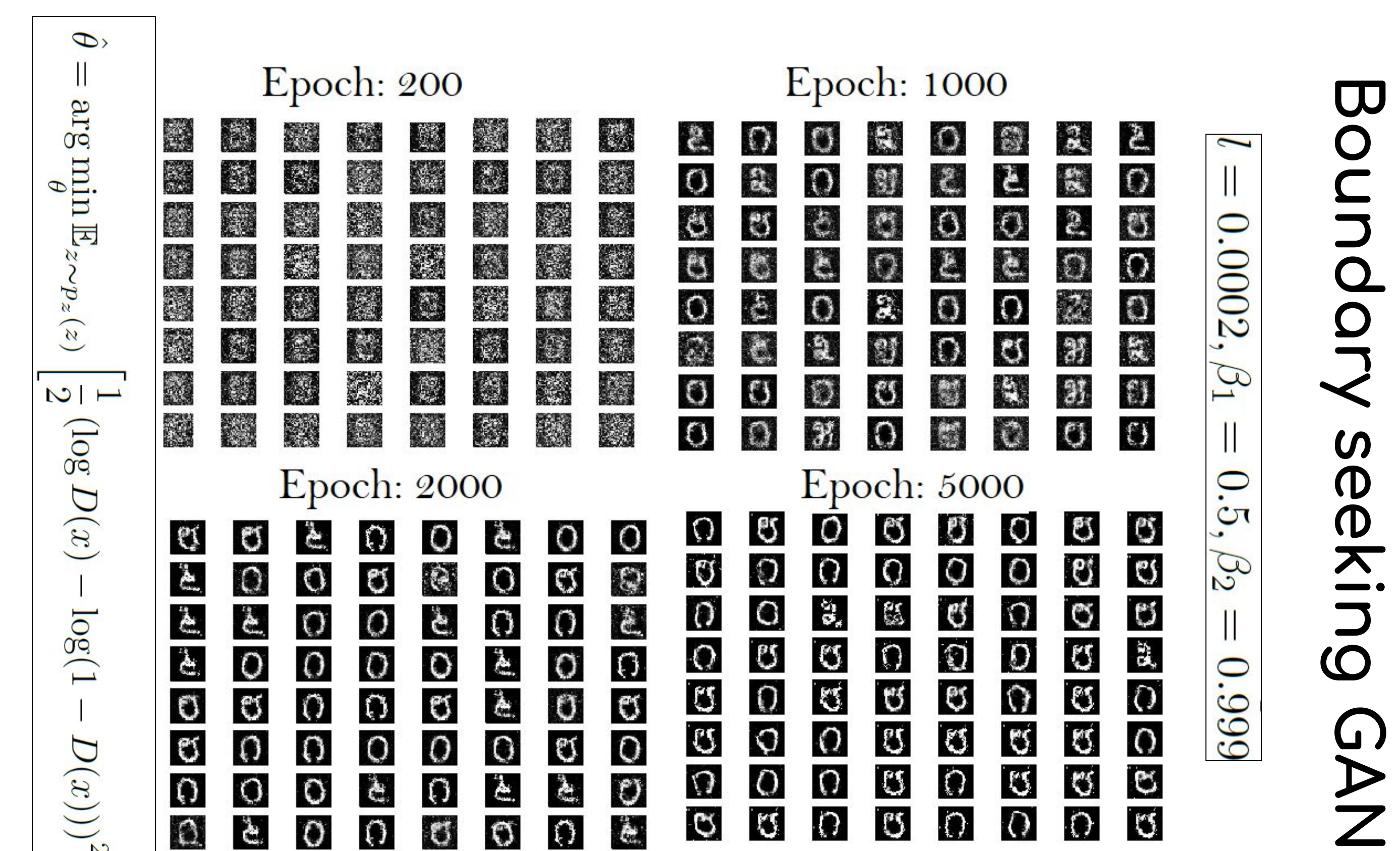


Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 26, 26, 32)	320
conv2d_2 (Conv2D)	(None, 24, 24, 64)	18496
max_pooling2d_1 (MaxPooling2D)	(None, 12, 12, 64)	0
dropout_1 (Dropout)	(None, 12, 12, 64)	0
flatten_1 (Flatten)	(None, 9216)	0
dense_1 (Dense)	(None, 128)	1179776
dropout_2 (Dropout)	(None, 128)	0
dense_2 (Dense)	(None, 10)	1290
Total params:		1,199,882
Trainable params:		1,199,882
Non-trainable params:		0

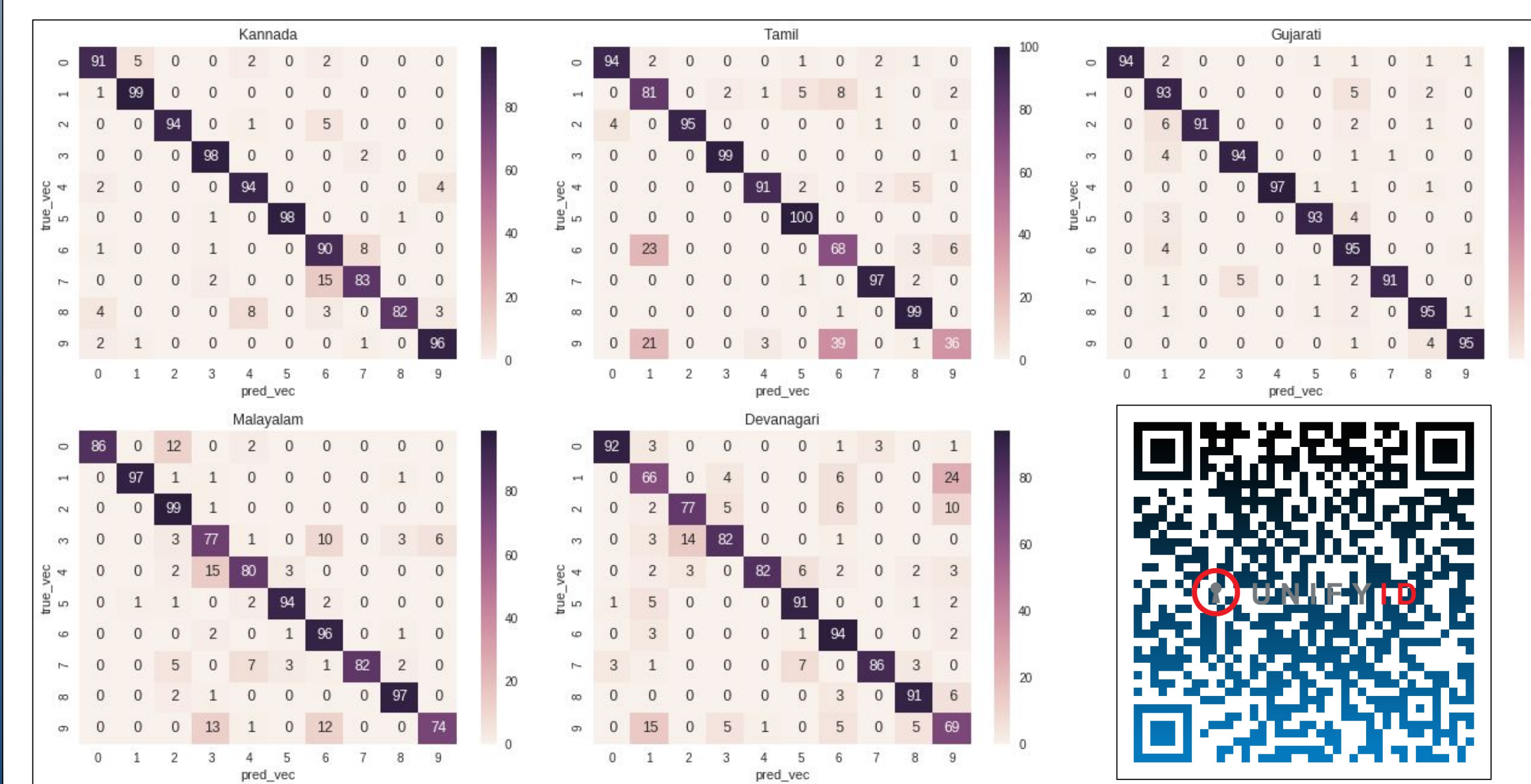
III: Indic-MNIST



IV: Results- Qualitative



Results- Quantitative



<https://github.com/unifyid-labs/DeepGenStruct-Notebooks>