ML4AAD - Final Project

Winter Semeseter 18/19

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4774378

February 24, 2019

Motivation (The Why)

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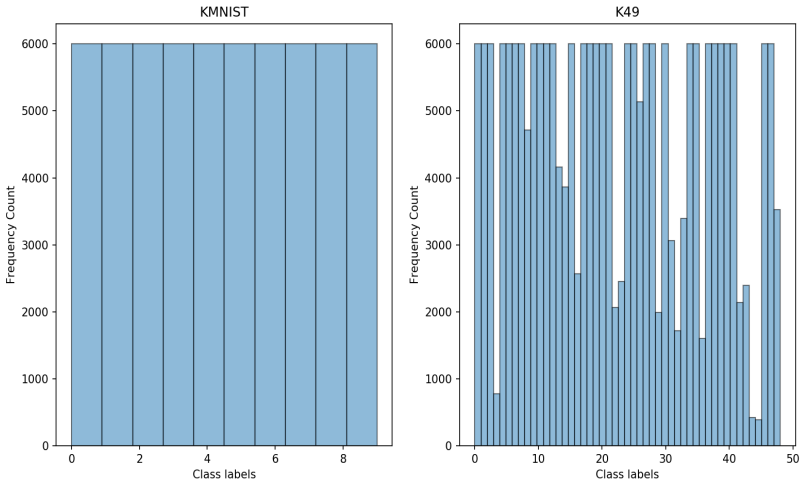
2 (similar) datasets with differing size, # of classes, class balance



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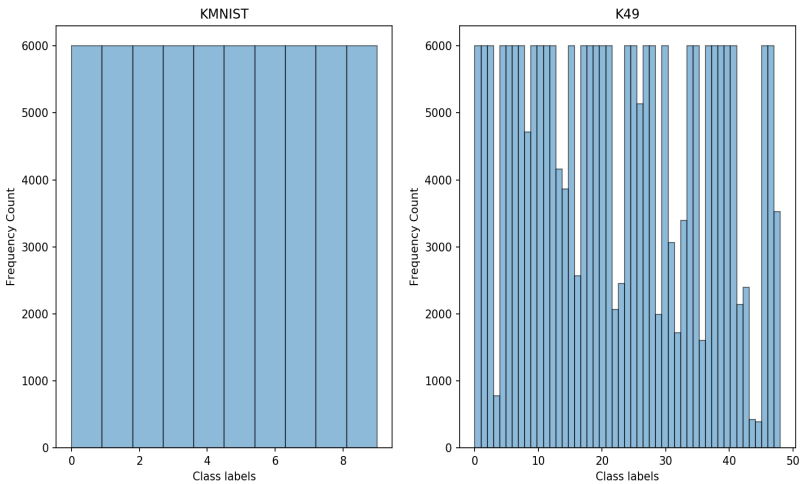
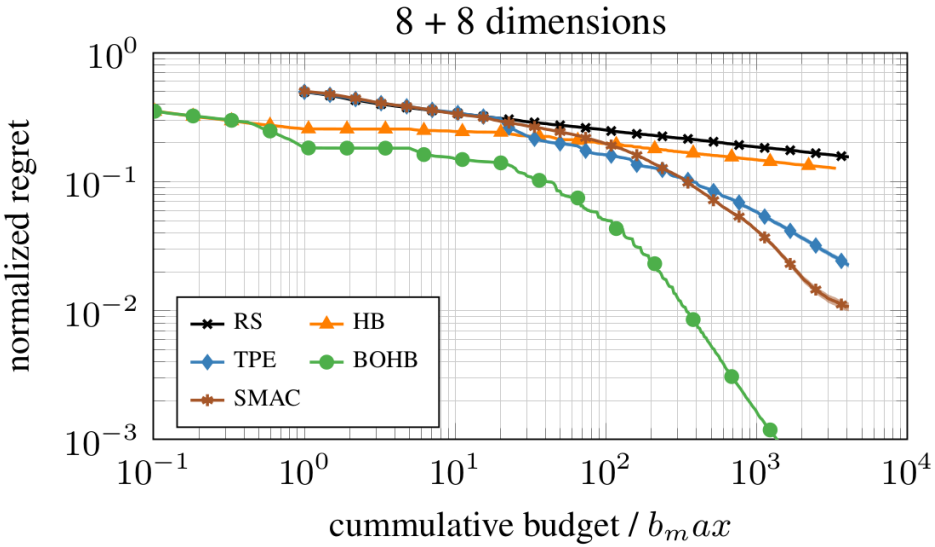


BOHB outperforms SMAC in high dimensional, mixed data



Design Decisions (and BOHB)

CNN Structure

$INPUT \rightarrow [CONV \rightarrow BATCHNORM? \rightarrow ACTIVATION \rightarrow DROPOUT? \rightarrow MAXPOOL?]*M \rightarrow [FC \rightarrow BATCHNORM? \rightarrow ACTIVATION \rightarrow DROPOUT?]*K \rightarrow OUTPUT$

$M \in \{1, 2, 3\}$; $K \in \{0, 1, 2\}$; $? \rightarrow \top or \bot$

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- CONVolution layers
  - Kernel size
  - Padding
  - Stride
- ACTIVATION (relu/sigmoid/tanh)
- BATCHNORM, DROPOUT
  - True or False
- MAXPOOL (if True)
  - Kernel size (=stride)

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- >30 hyperparameters
- (Budget = Epochs) $\rightarrow$ expensive runs

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BOHB params:

eta	min_budget	max_budget
2	1	16
4	1	16
3	1	9
2	1	10

BOHB on KMNIST (and K49)

Dataset	eta_min_max_iter (BOHB)	Validation Accuracy	Train Accuracy	Test Accuracy	BOHB Runtime
KMNIST	2_1_16_10	98.08%	99.58%	94.69%	<3 hrs
KMNIST	3_1_9_20	97.17%	98.23%	93.26%	<3 hrs
KMNIST	4_1_16_20	98.26%	99.95%	95.98%	<4 hrs
KMNIST	2_1_10_14	97.77%	99.98%	94.09%	<4 hrs
KMNIST	3_2_20_20	98.31%	99.57%	95.51%	<6 hrs

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KMNIST	3_2_20_20	98.31%	99.57%	95.51%	<6 hrs
K49	3_1_9_10	89.06%	99.93%	88.12%	<5 hrs
K49	2_1_10_10	91.19%	99.25%	88.25%	<12 hrs

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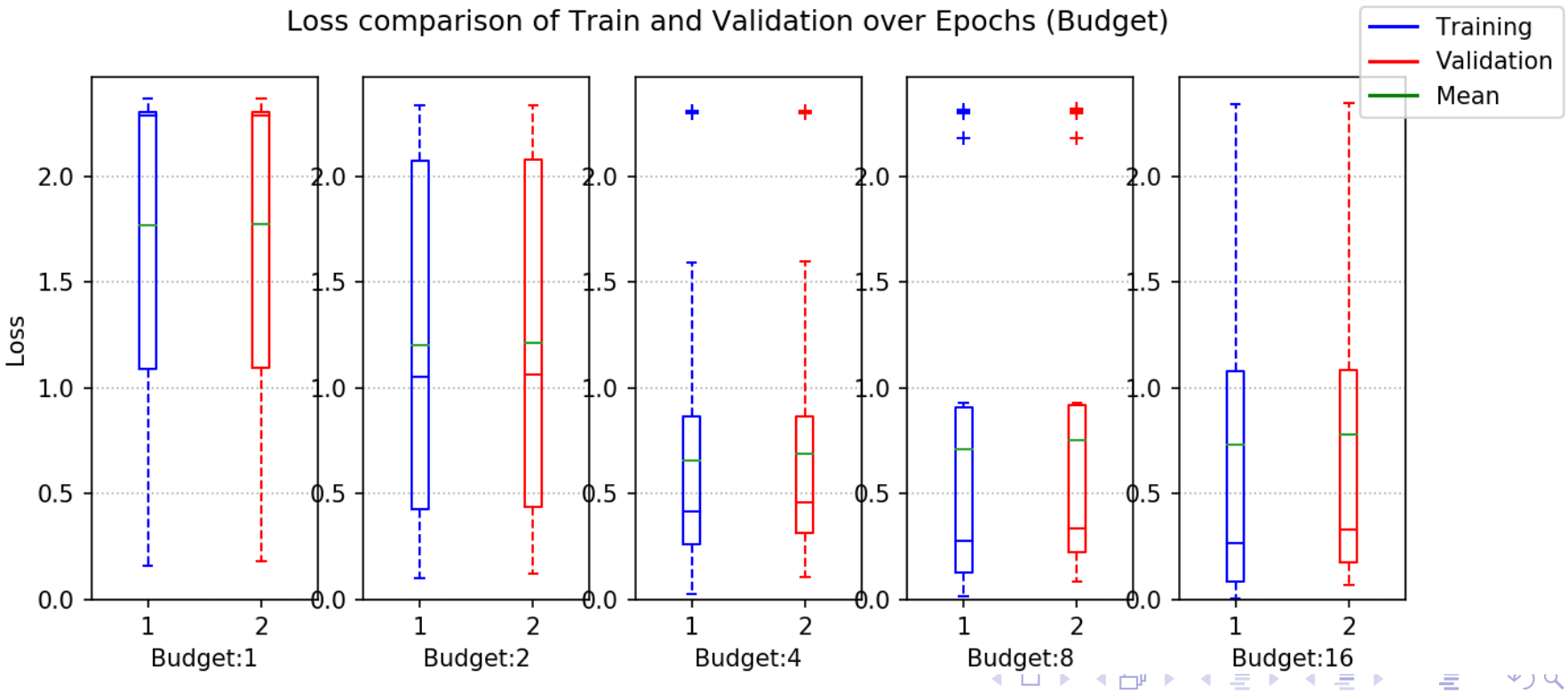

Extracting juice (Can K49 leverage KMNIST?)

Model: KMNIST $\rightarrow$ K49

KMNIST Test	K49 Train	K49 Test	Run-time
94.69%	96.45%	89.91%	<1hr
95.51%	95.62%	90.20%	<1hr
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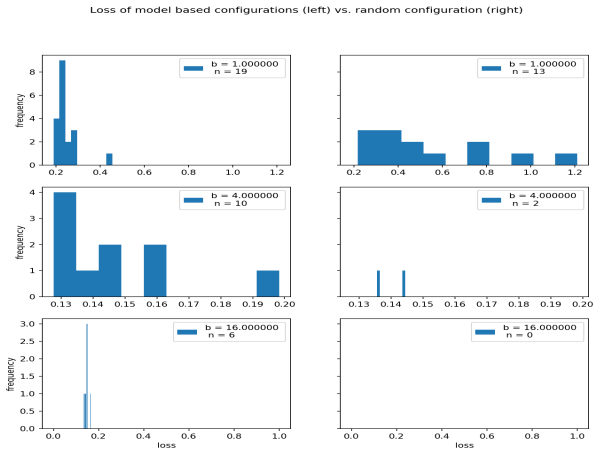

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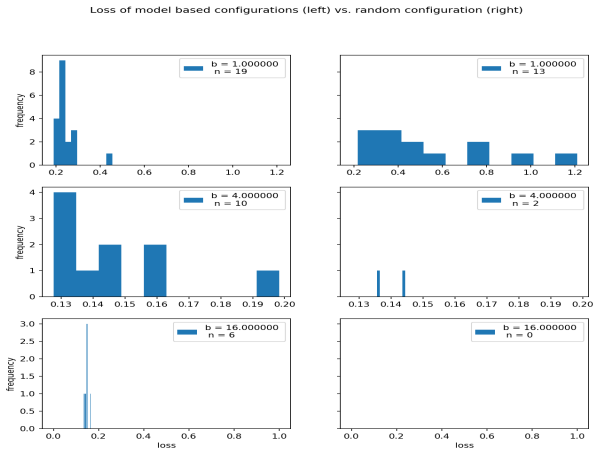

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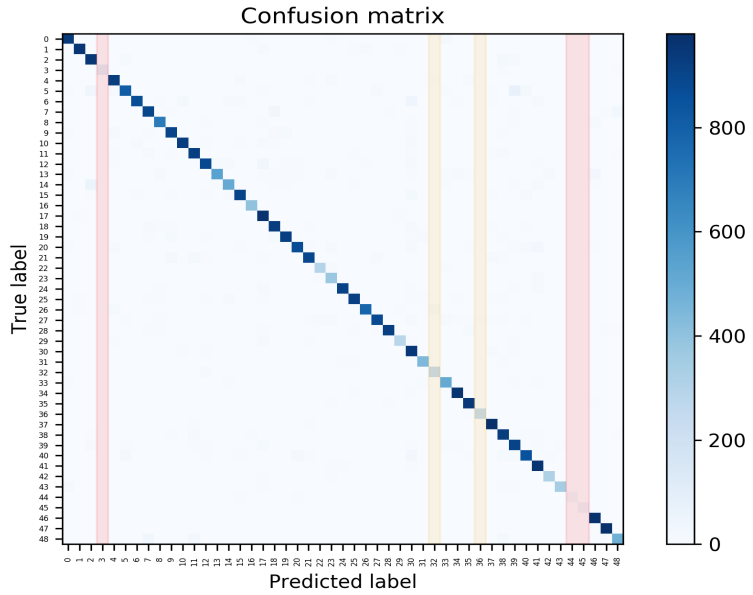

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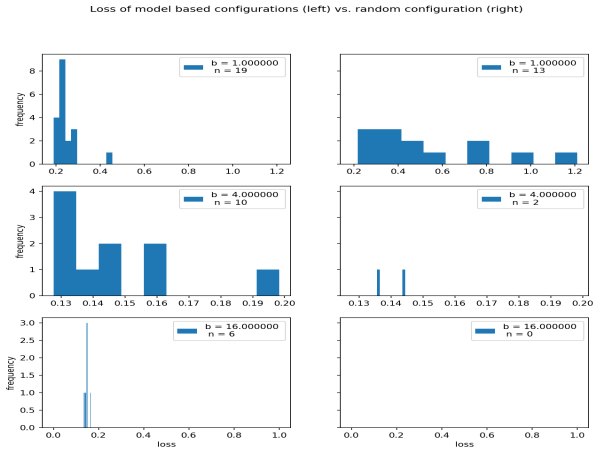

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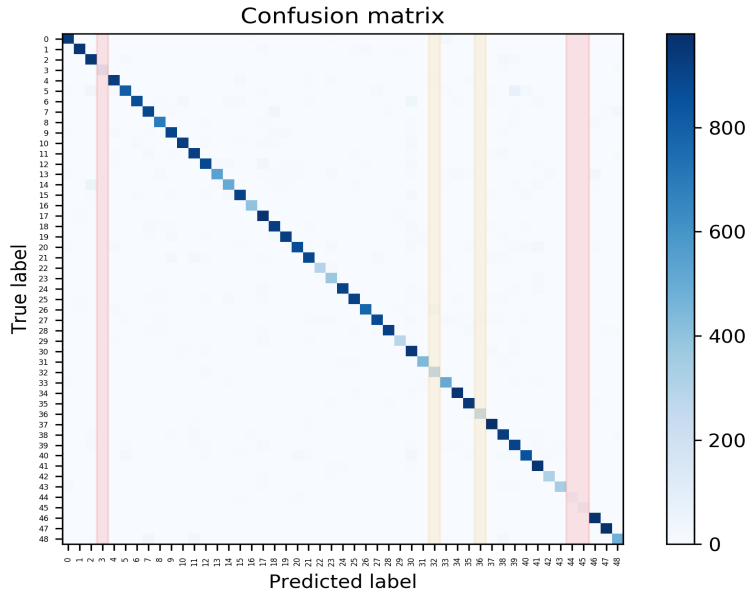

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Final Results

Final numbers to report.