ML4AAD - Final Project

Winter Semeseter 18/19

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4774378

February 24, 2019

Motivation (The Why)

AAAAAHH!!
WWW.PHDCOMICS.COM
sip...
aahh..

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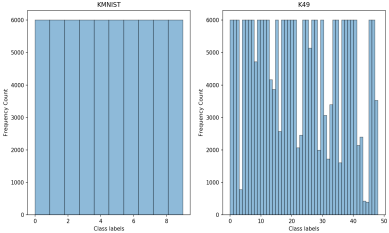
2 (similar) datasets with differing size, # of classes, class balance



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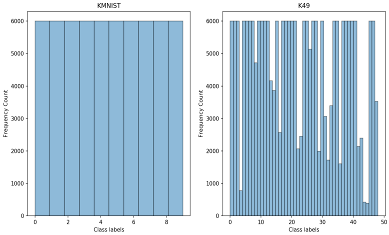
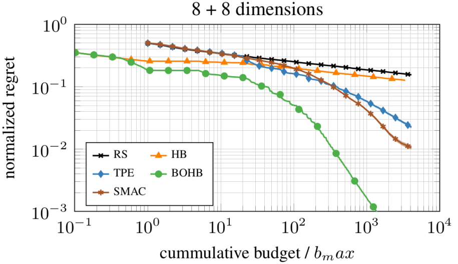


BOHB outperforms SMAC in high dimensional, mixed data



Design Decisions (and BOHB)

CNN Structure

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

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

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  - Padding
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- BATCHNORM, DROPOUT
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- >30 hyperparameters
- (Budget = Epochs) → 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%	99.81%	95.06%	<3 hrs
KMNIST	3_1_9_20	97.17%	98.23%	93.26%	<3 hrs
KMNIST	4_1_16_20	98.26%	99.98%	96.41%	<4 hrs
KMNIST	2_1_10_14	97.77%	99.86%	94.08%	<4 hrs
KMNIST	3_2_20_20	98.31%	99.62%	95.41%	<6 hrs

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K49	2_1_10_10	91.19%	99.25%	88.25%	<12 hrs

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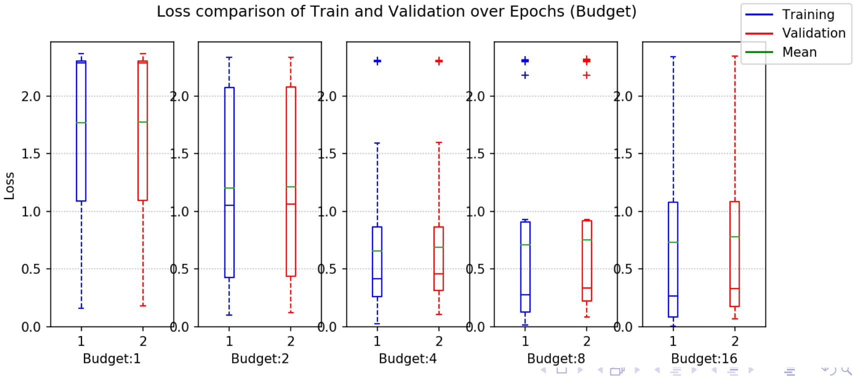

Extracting juice (Can K49 leverage KMNIST?)

Model: KMNIST → K49

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Configuration: KMNIST $\xrightarrow{\text{BOHB}}$ K49

Hyperparameters:

- # of channels
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KMNIST Test	K49 Train	K49 Test	Run-time
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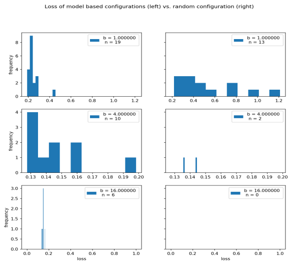

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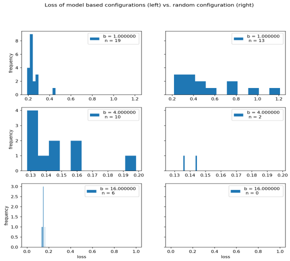

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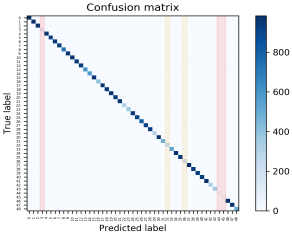

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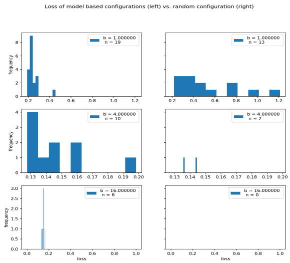
Loss of model based configurations (left) vs. random configuration (right)

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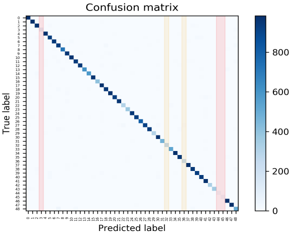

Issues: (i) Slow experiments; (ii) Under-represented classes; [(iii) What if only K49?]

In Conclusion...

Possible improvements:

- Fidelity (data subsets)
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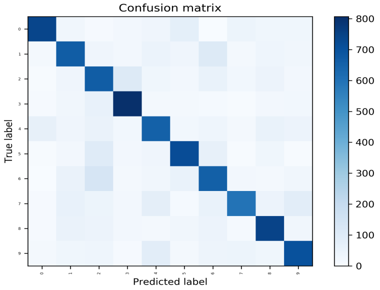
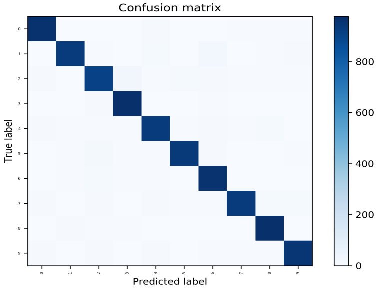
Final Numbers:

Dataset	Default Test	Best Test
KMNIST	69.56%	97.89%
K49	54.43%	94.28%

KMNIST: *from transferring best K49 model*
K49: *from transferring incumbent config on KMNIST and then BOHB on K49*


Confusion matrix
True label
Predicted label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