

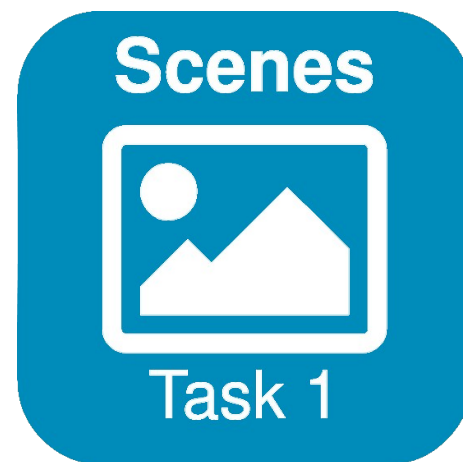
Feature Selection Using ADMM for Low-Complexity Acoustic Scene Classification

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Problem Definition

- ASC common task for resourced constrained devices
- This year: additional MMACs constraint

MACs scale with input features for convolutional models (here BC-Resnet)



Problem Definition

- ASC common task for resourced constrained devices
- This year: additional MMACs constraint
 - MACs scale with input features for convolutional models (here BC-Resnet)
- Reasoning for feature selection
 - Reduce MACs by band decimation
 - Reduce weakly correlated features; make model more robust against overfitting
 - Interpret resulting feature masks for dataset



Toolbox – Alternating Direction Method of Multipliers (ADMM)

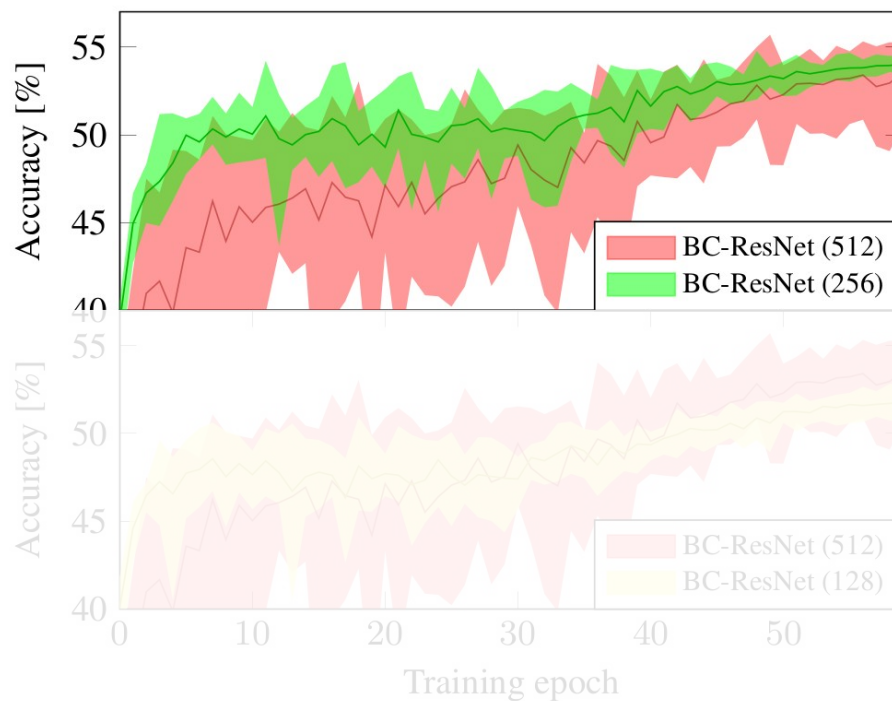
- Limit on number of features
- Split with add. equality constraint
- Dual decomposition + Augmented Lagrangian \rightarrow ADMM

- Also used for model compression:
 - Structured Pruning – StructADMM
 - Quantization - ADMM-NN



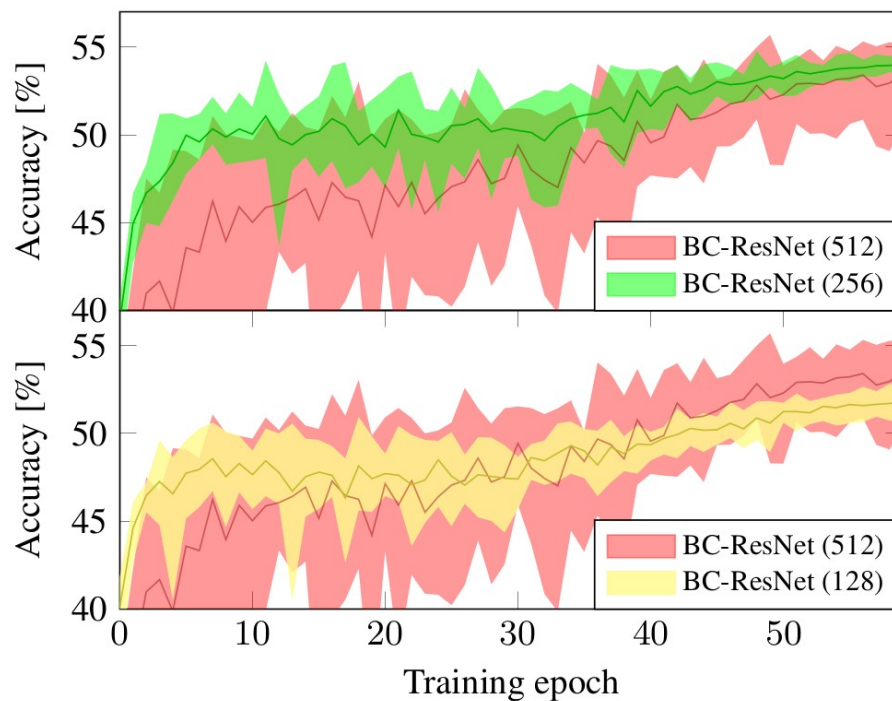
Training Statistics after Feature Reduction

- Reduce weakly correlated features makes less prone to overfitting
- Training more stable during hyperparameter search → fewer runs

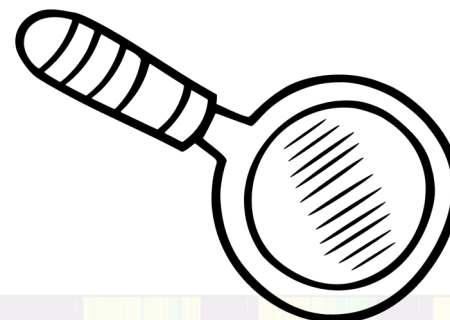


Training Statistics after Feature Reduction

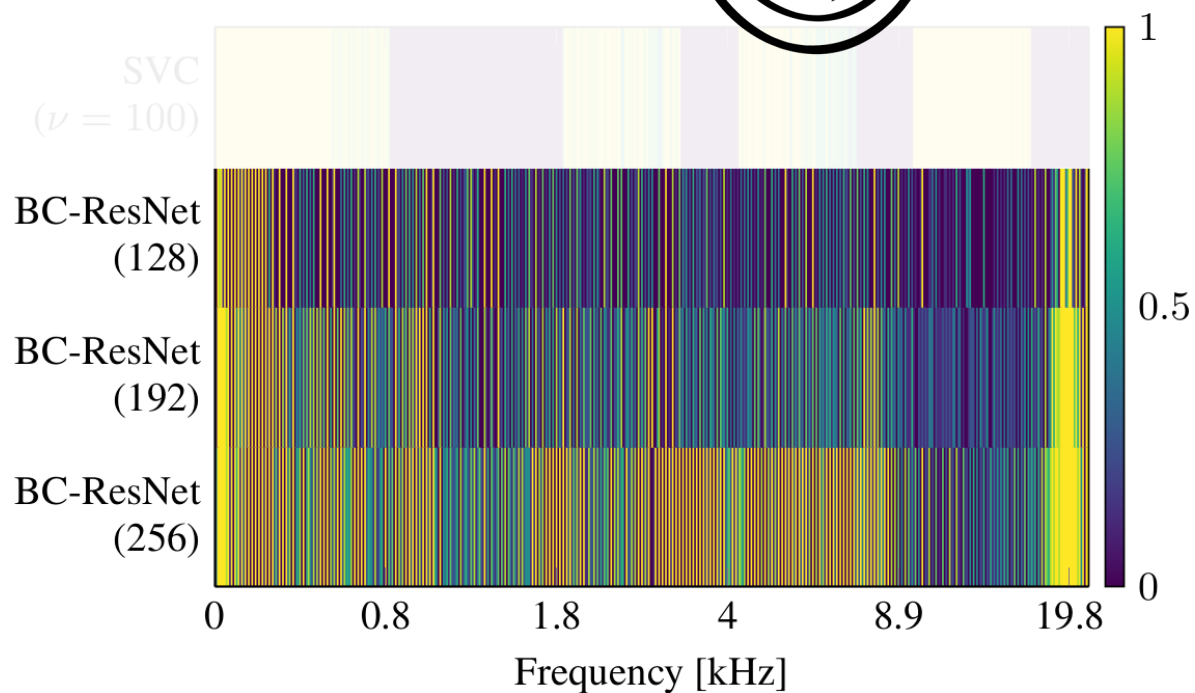
- Reduce weakly correlated features makes less prone to overfitting
- Training more stable during hyperparameter search → fewer runs
- Reducing even more introduces bias for training validation score



Feature Selection Patterns

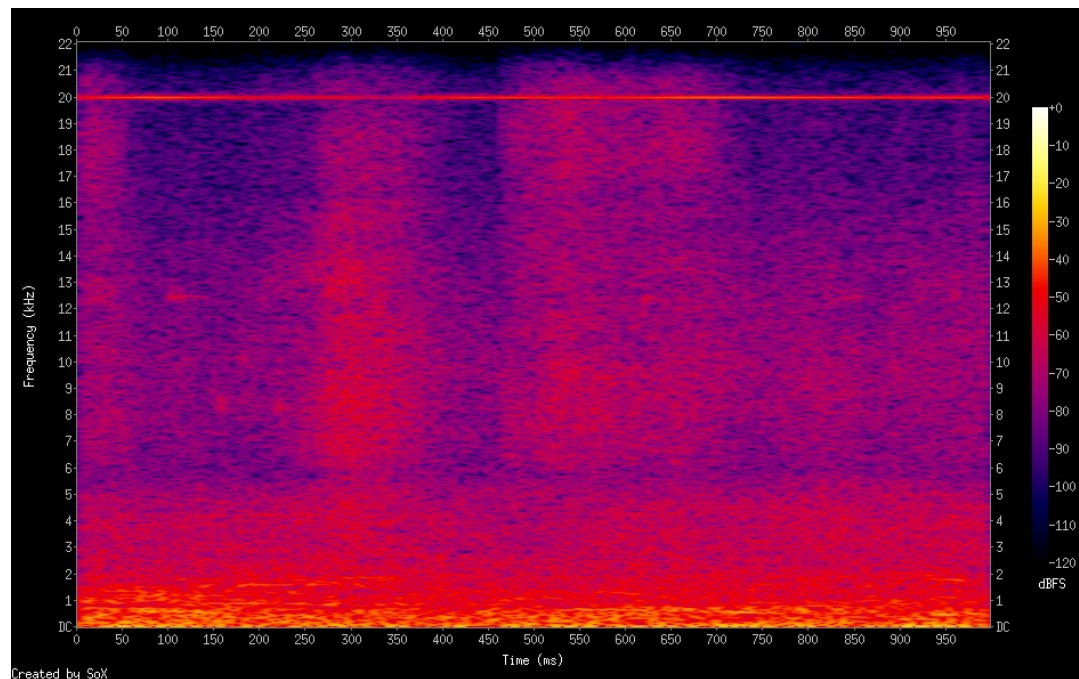


- Most information contained up to 8kHz
- Below 500Hz decimated by two; Below 80Hz no decimation
- Decreasing features lead to sparsity with regular patterns
- Interesting peak at ~19.8kHz



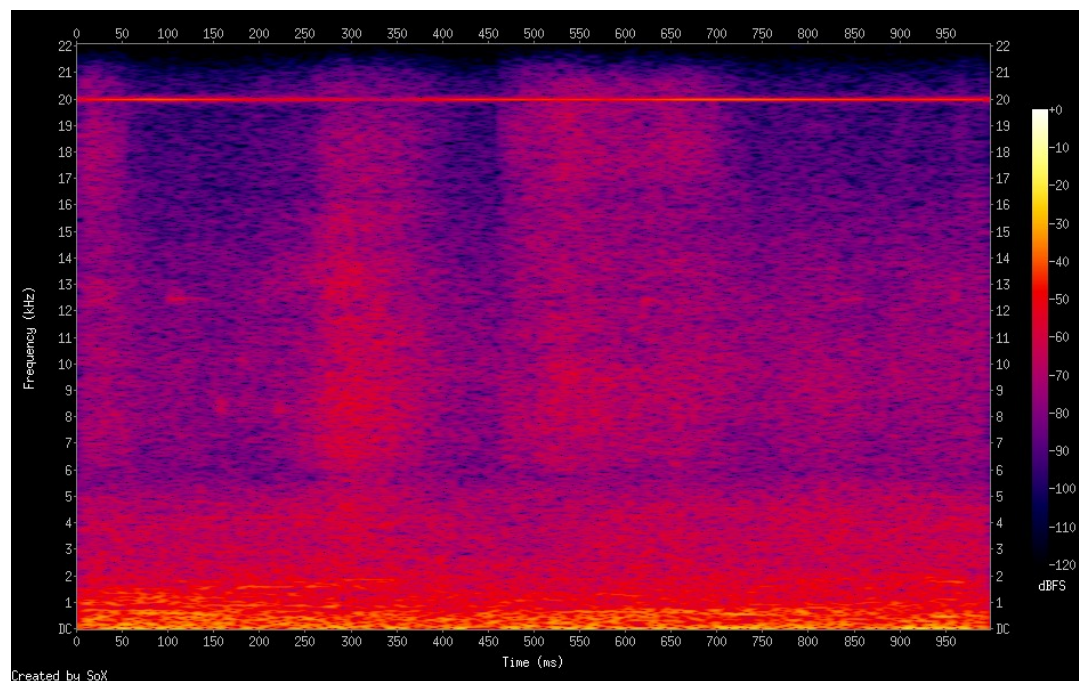
Bonus – Dataset Shift and Spectrogram Peak

	Airport [dB]
A	18.618
B	15.255
C	14.039
S1	-6.322
S2	9.270
S3	-1.373
S4	-0.507
S5	-6.726
S6	-1.777



Bonus – Dataset Shift and Spectrogram Peak

	Airport [dB]	Tram [dB]
A	18.618	-0.932
B	15.255	2.896
C	14.039	-0.502
S1	-6.322	-9.017
S2	9.270	5.103
S3	-1.373	-5.002
S4	-0.507	-4.792
S5	-6.726	-8.885
S6	-1.777	-6.285



Thank You For Listening!