

ON A TIME-FREQUENCY BLURRING OPERATOR WITH APPLICATIONS IN DATA AUGMENTATION

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ABSTRACT. Inspired by the success of recent data augmentation methods for signals which act on a phase space representation of the signal, we introduce an operator which convolves the short-time Fourier transform of a signal with a specified kernel. Analytical properties including boundedness, compactness and positivity are investigated from the perspective of time-frequency analysis. The operator is also implemented numerically in several different versions and examples are presented. To explore the effectiveness of the operator for data augmentation, a simple convolutional neural network is trained to classify audio signals using spectrograms with different augmentations setups with results indicating that the operator significantly improves test performance, especially in the data-starved regime.

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