Convolutional Generative Adversarial Networks with Binary Neurons for Polyphonic Music Generation

Hao-Wen Dong and Yi-Hsuan Yang
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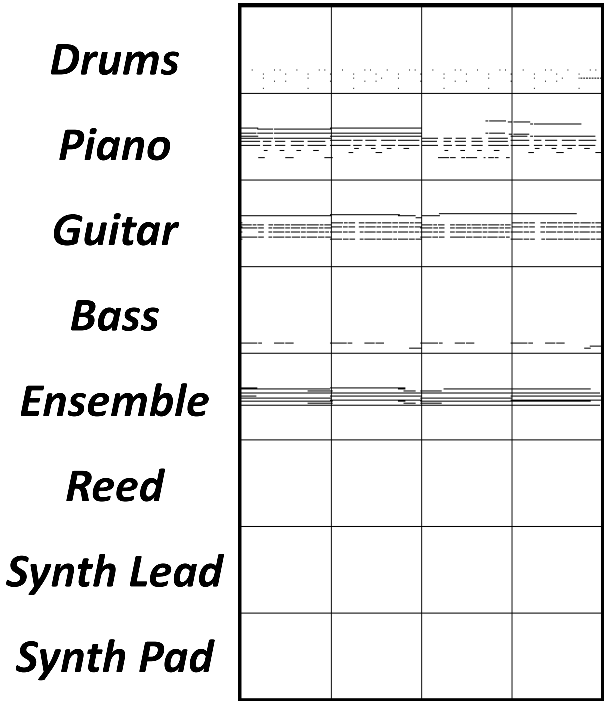
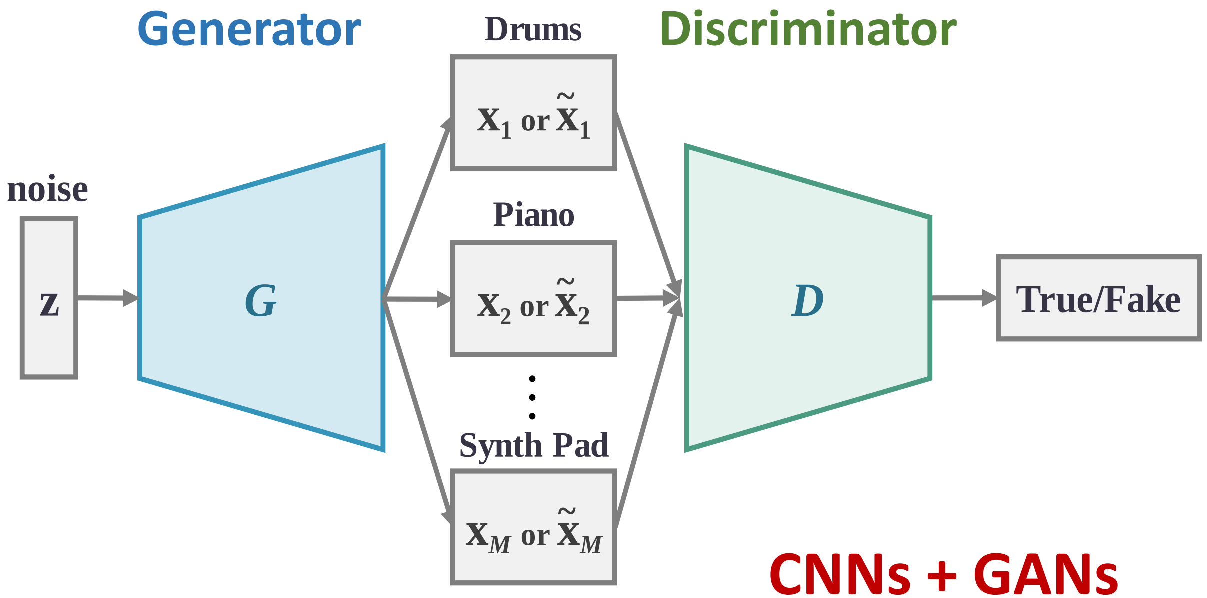
stand B-7

Target outputs - Multi-track piano-rolls



multi-track
polyphonic

Convolutional Generative Adversarial Networks



CNNs + GANs

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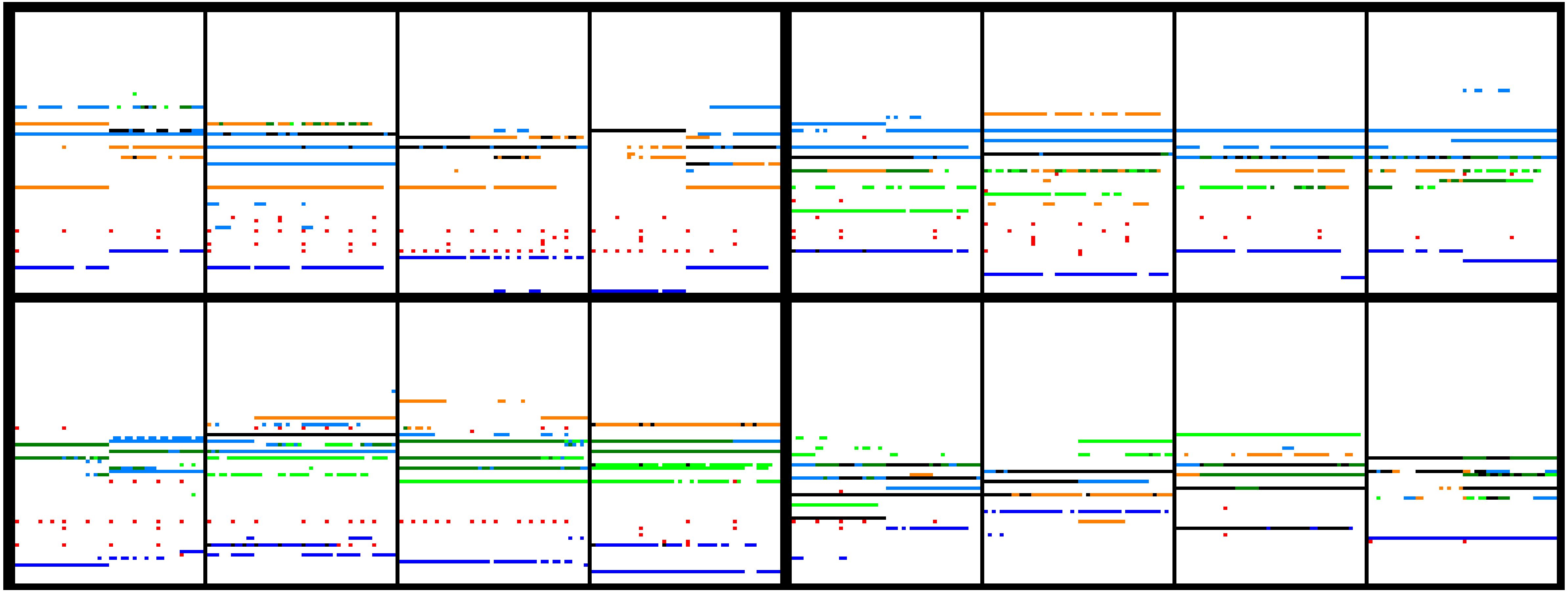
Drums Piano Guitar Bass Strings



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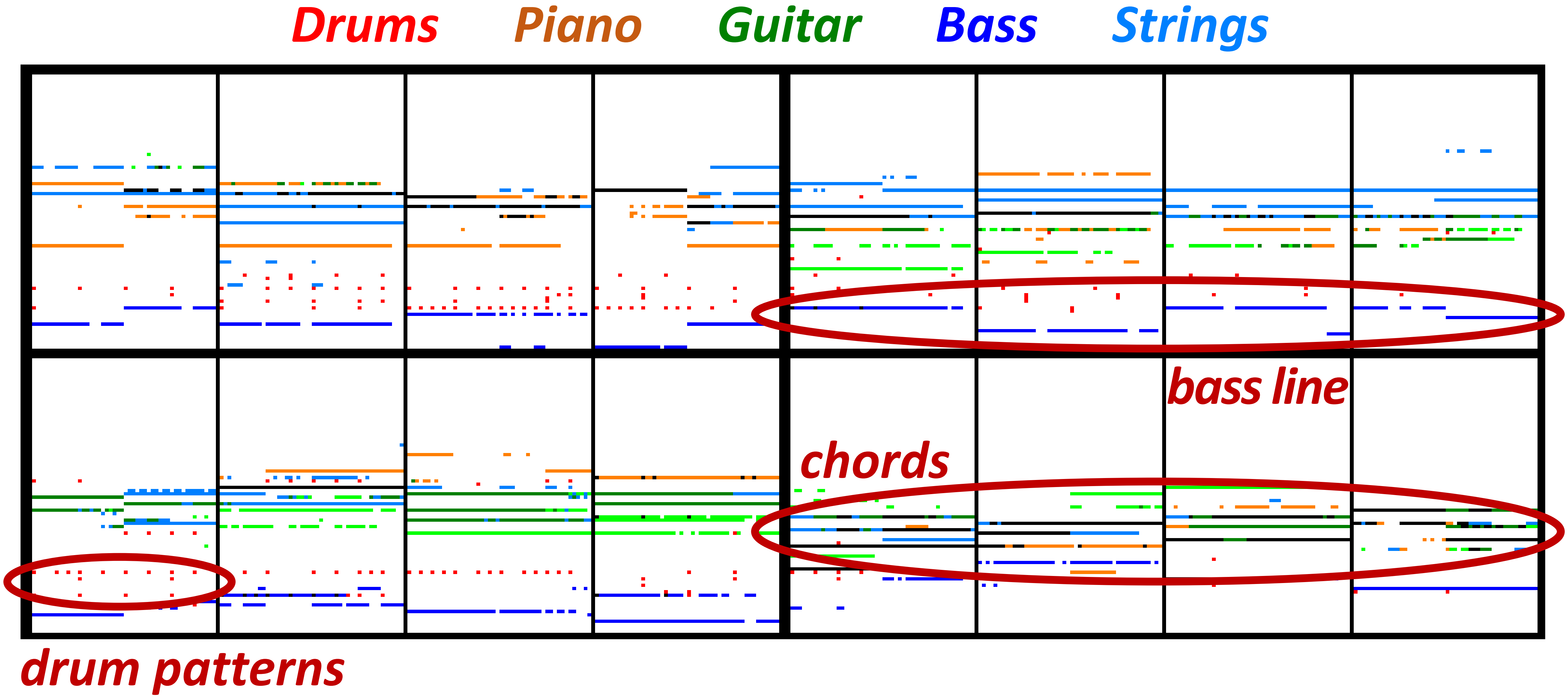

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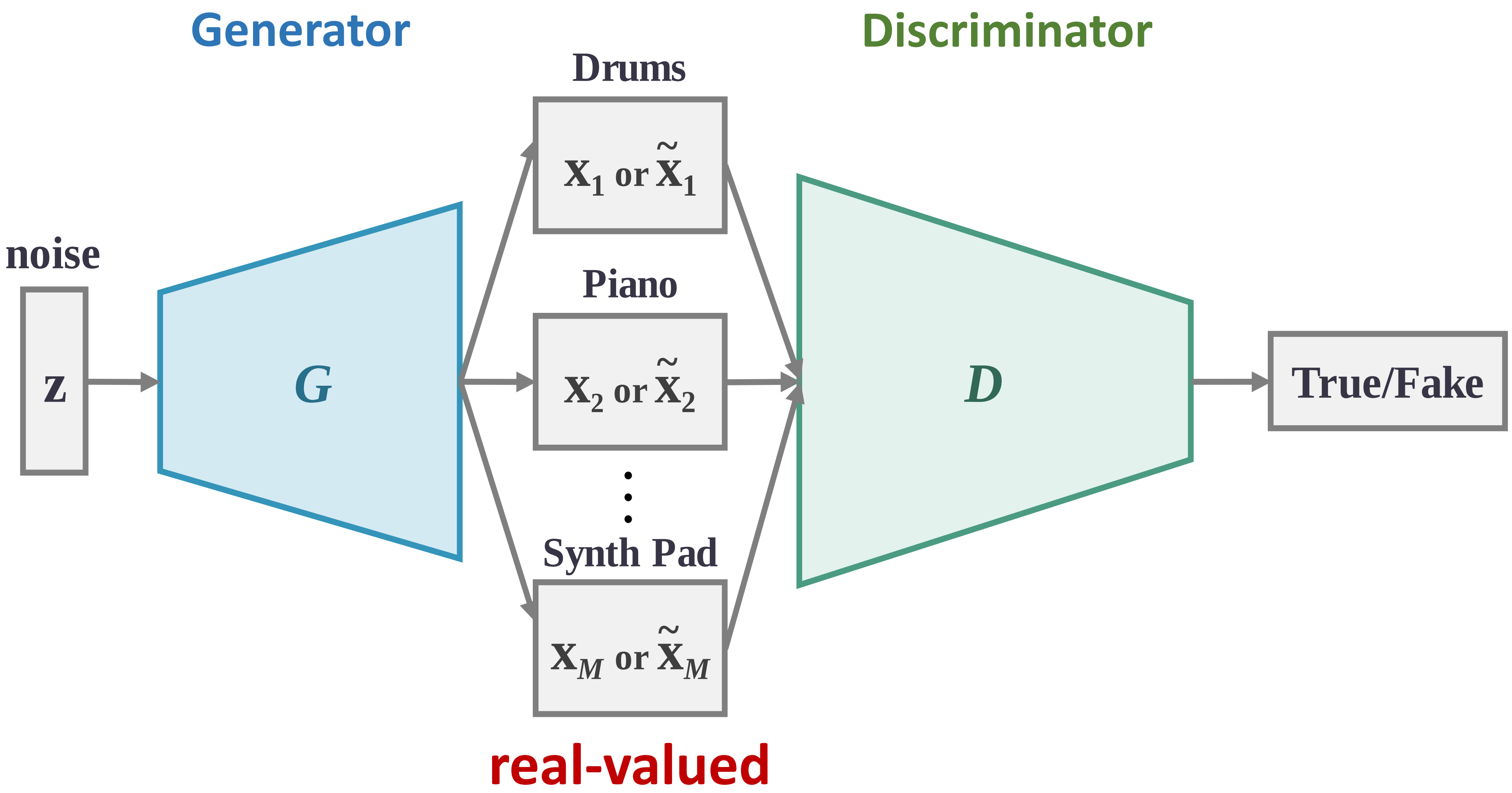

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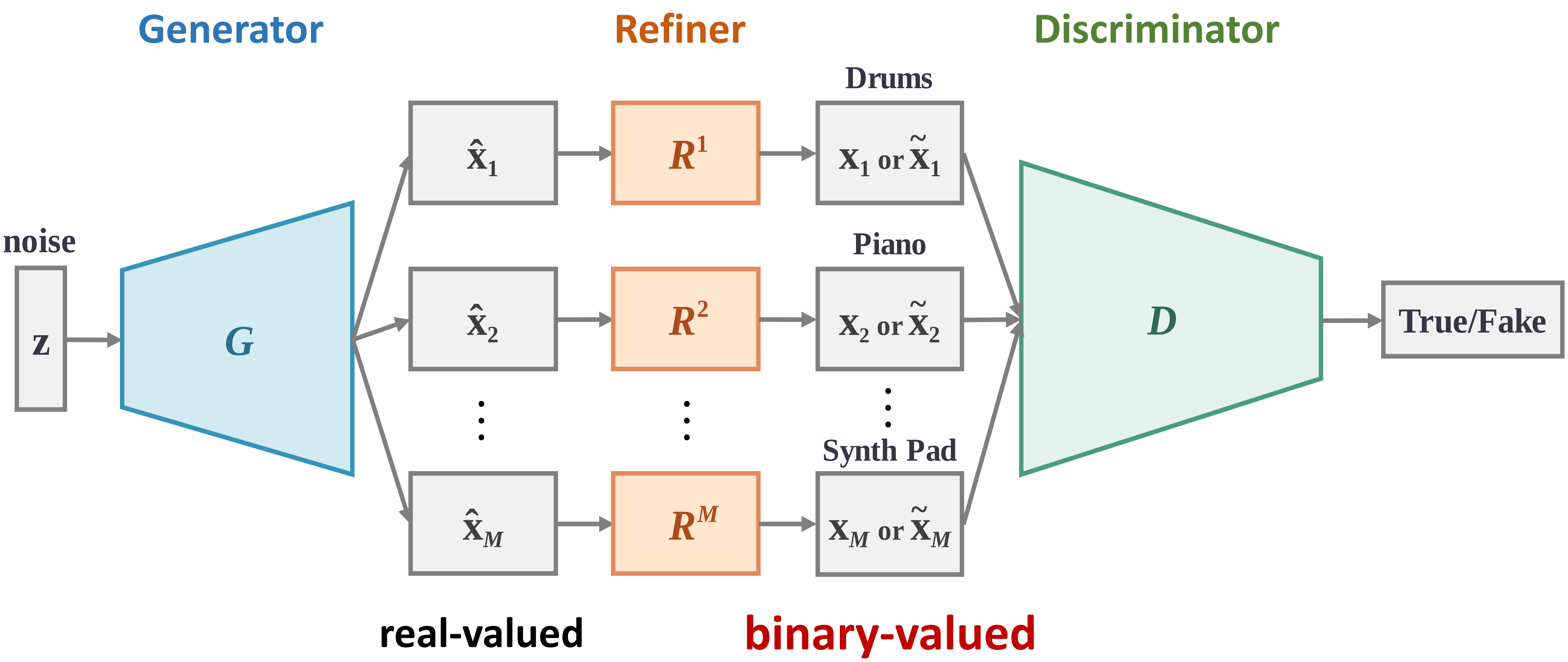

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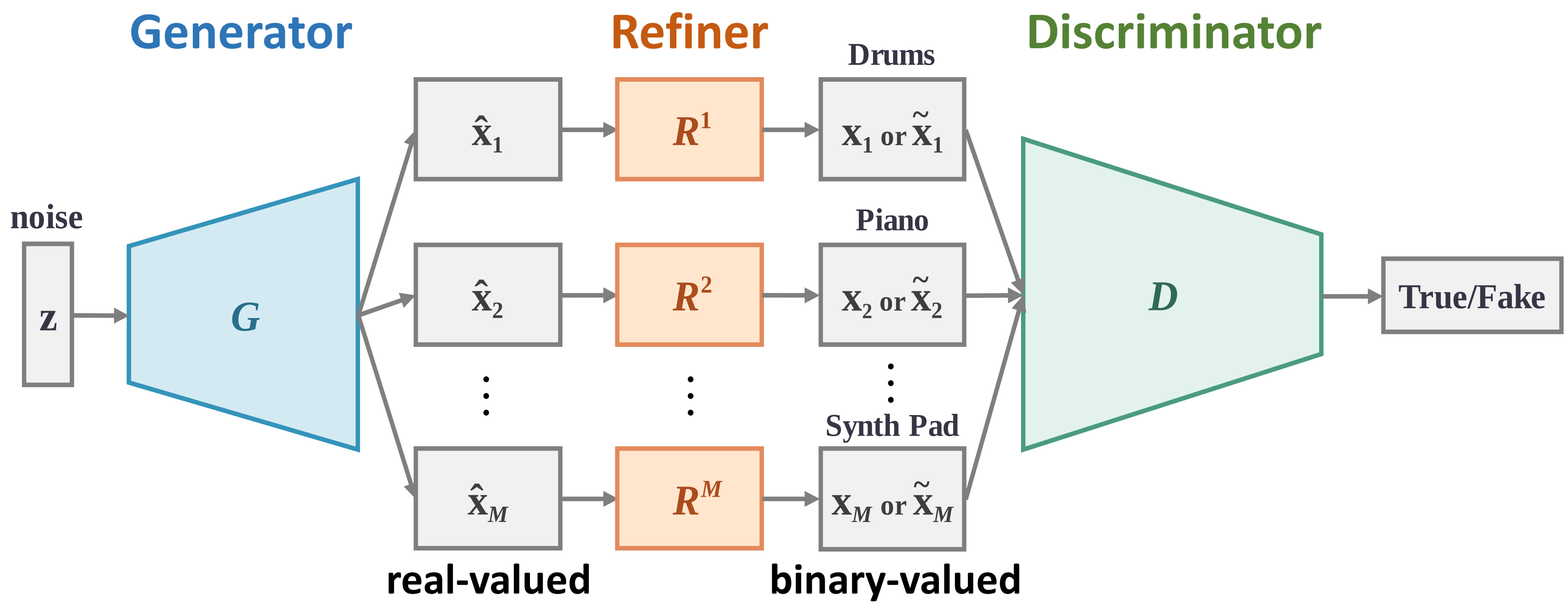

	Generator's outputs	Real data
MuseGAN	real-valued	binary-valued
BinaryMuseGAN	**binary-valued**	binary-valued

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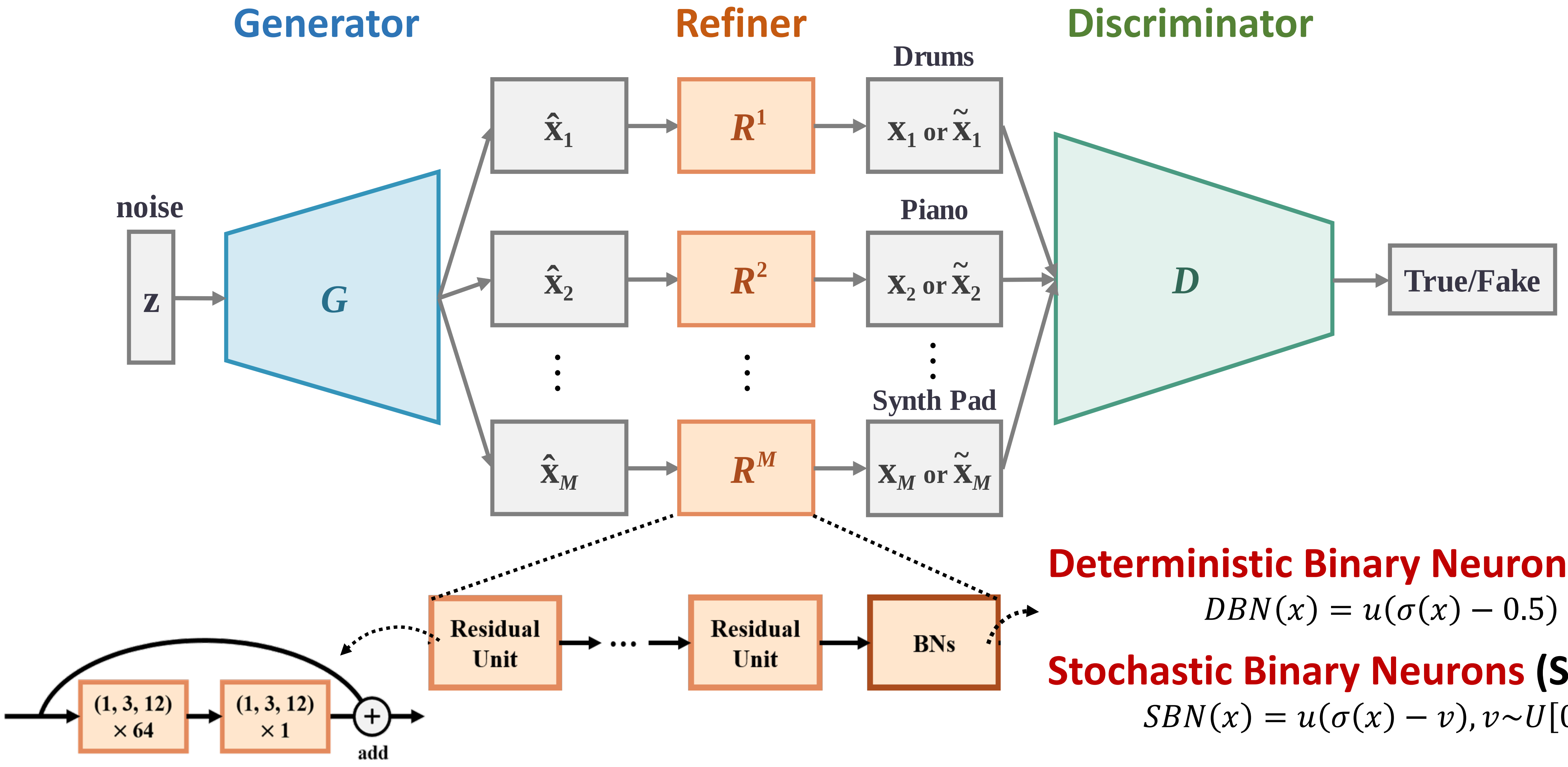

Deterministic Binary Neurons (DBNs)

$$DBN(x) = u(\sigma(x) - 0.5)$$

Stochastic Binary Neurons (SBNs)

$$SBN(x) = u(\sigma(x) - v), v \sim U[0, 1]$$

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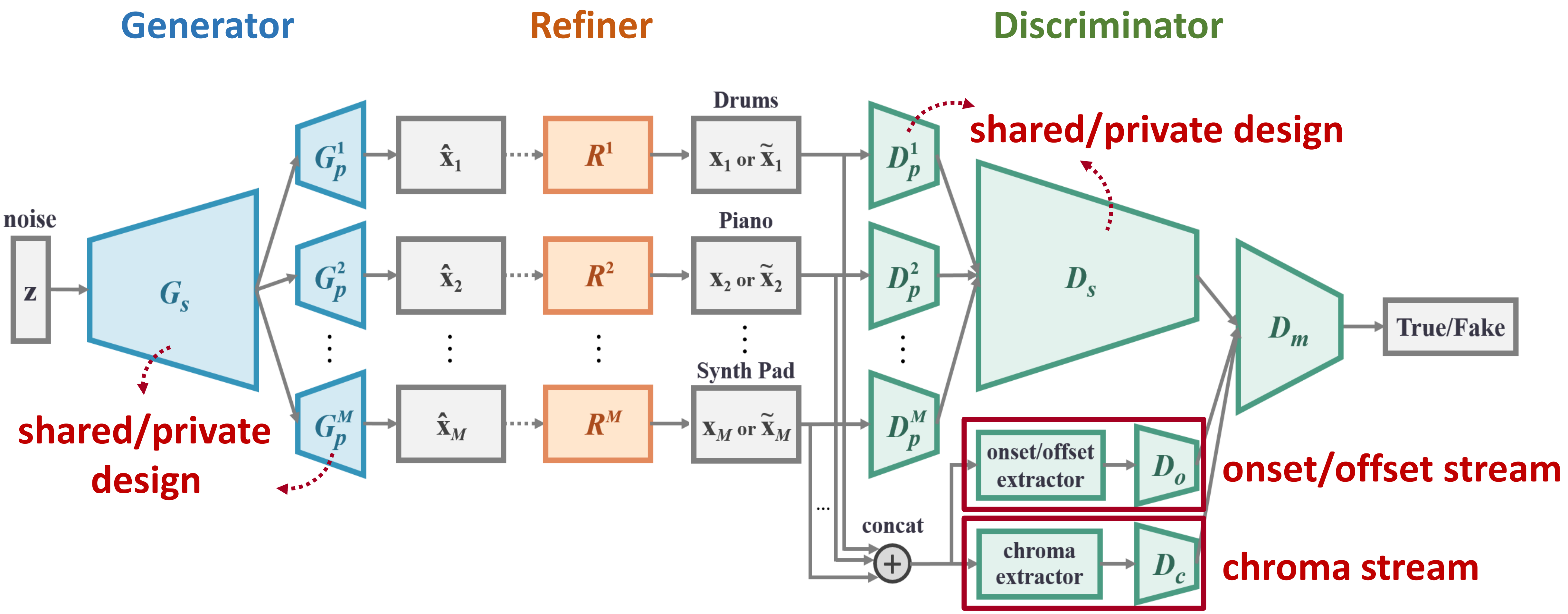

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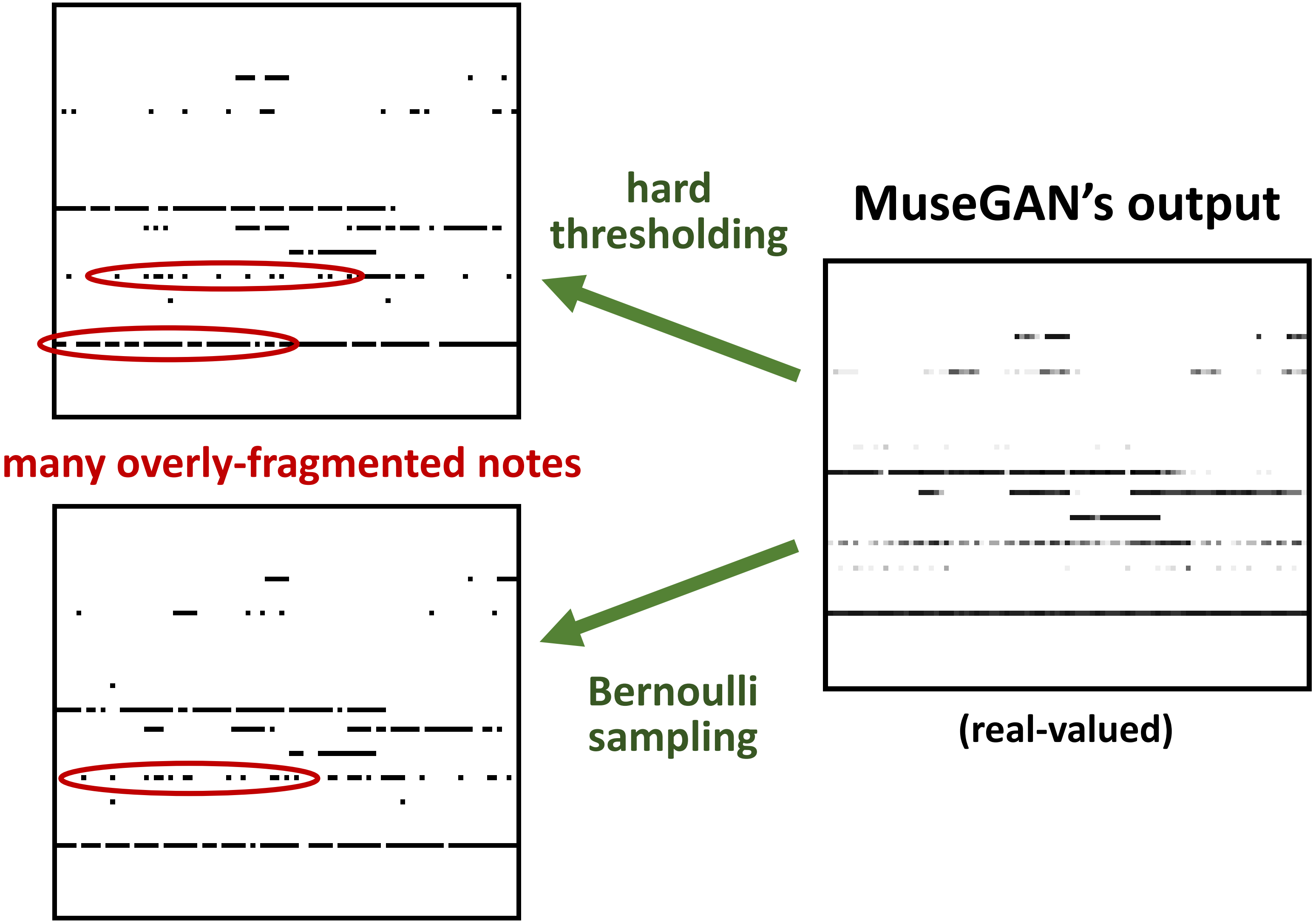

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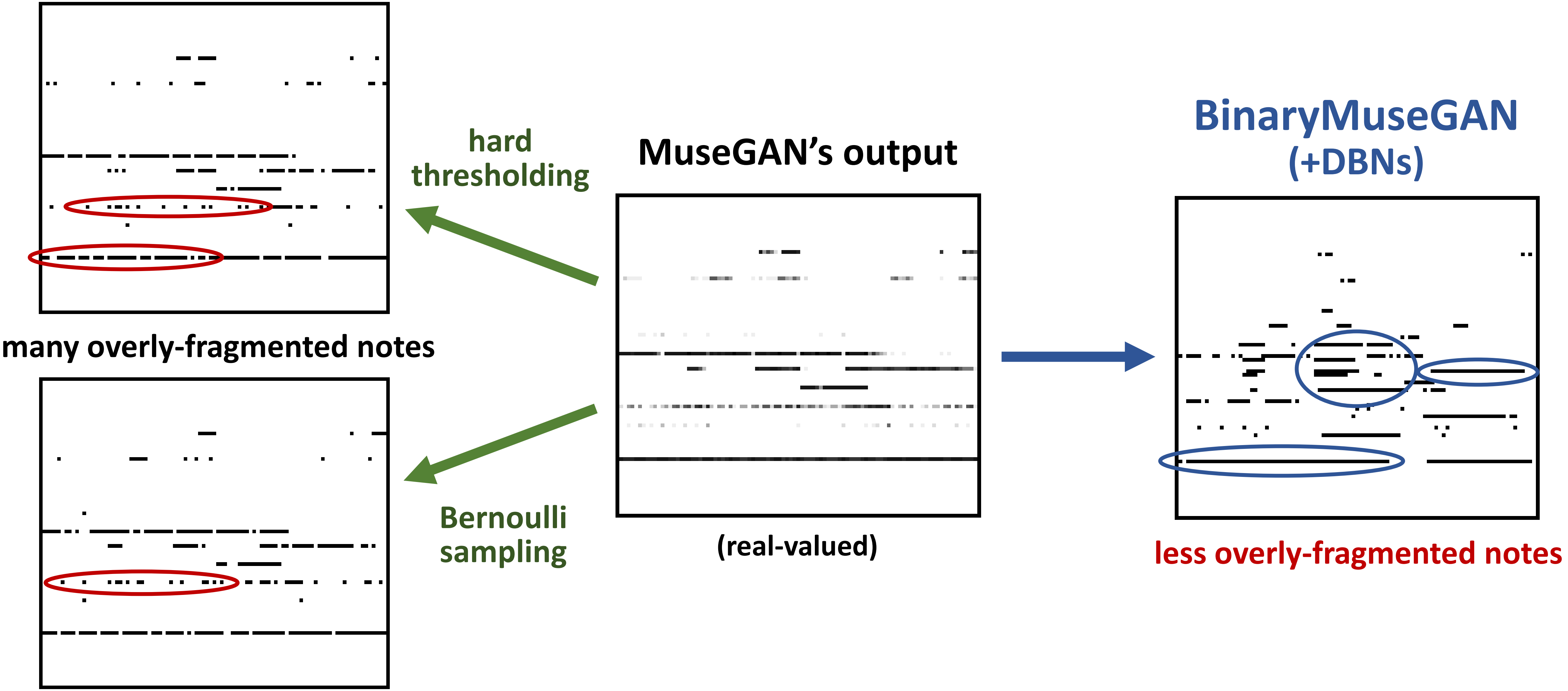

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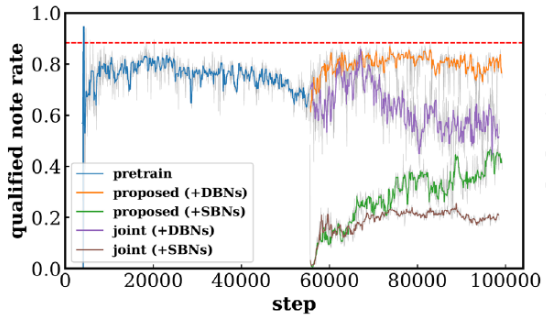
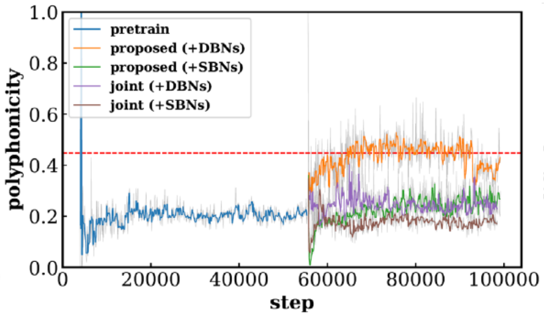
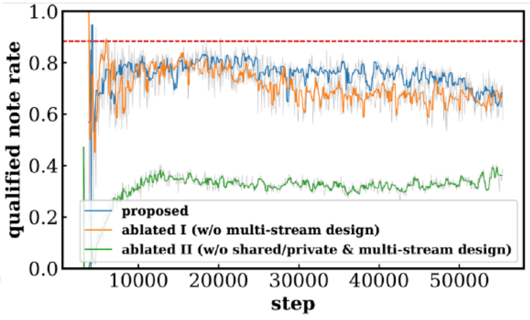
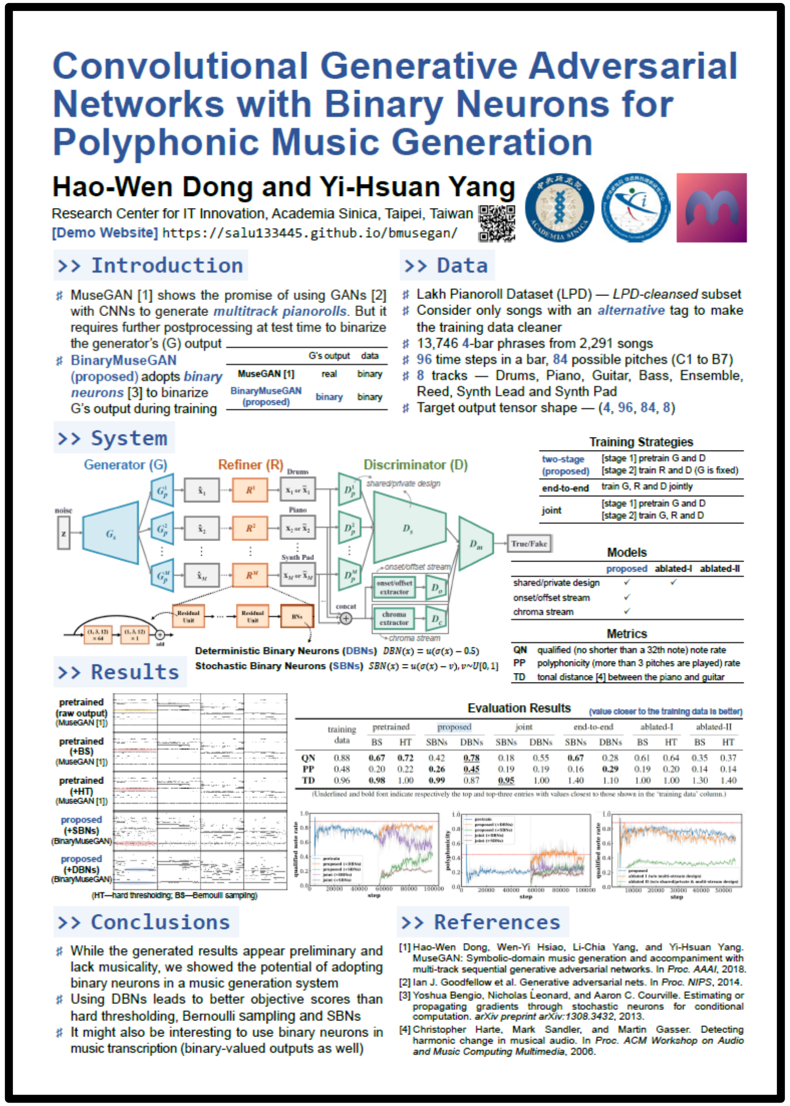
MuseGAN **BinaryMuseGAN** (different training strategies)

	training data	pretrained		proposed		joint		end-to-end	
		BS	HT	SBNs	DBNs	SBNs	DBNs	SBNs	DBNs
QN	0.88	**0.67**	**0.72**	0.42	**0.78**	0.18	0.55	**0.67**	0.28
PP	0.48	0.20	0.22	**0.26**	**0.45**	0.19	0.19	0.16	**0.29**
TD	0.96	**0.98**	1.00	**0.99**	0.87	**0.95**	1.00	1.40	1.10









Come to learn more and listen to the demos!