ReCoRe: Regularized Contrastive Representation Learning of World Model

Supplementary Material

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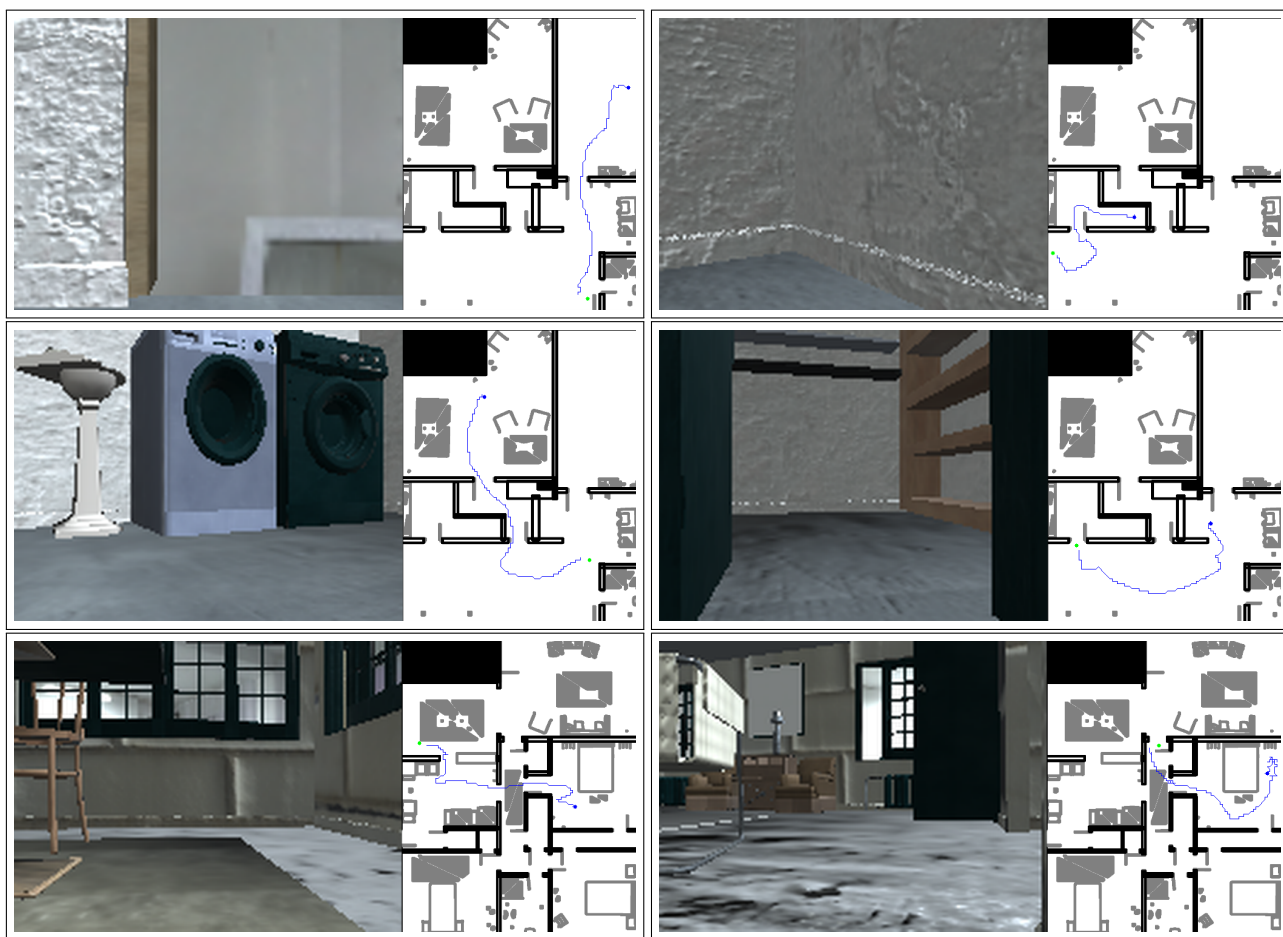## 1. Qualitative Results of ReCoRe

Figure 1. The out-of-distribution generalization tests of proposed ReCoRe on held-out scenes and visual textures from iGibson 1.0. Green circle is a random *PointGoal*, blue circle is a random starting point and blue line represents the travel path of the Turtlebot robot.

2. Hyper Parameters

Name	Symbol	Value
World Model		
Dataset size (FIFO)	—	$3 \cdot 10^5$
iGibson input image size	o	120×160
Batch size	B	50
Sequence length	L	50
Discrete latent dimensions	—	32
Discrete latent classes	—	32
RSSM number of units	—	1024
KL loss scale	β	1.0
World model learning rate	—	$3 \cdot 10^{-4}$
Key encoder exponential moving average	—	0.999
Behavior		
Imagination horizon	H	15
Actor learning rate	—	$1 \cdot 10^{-4}$
Critic learning rate	—	$1 \cdot 10^{-4}$
Slow critic update interval	—	100
Common		
Policy steps per gradient step	—	4
Policy and reward MPL number of layers	—	4
Policy and reward MPL number of units	—	400
Gradient clipping	—	100
Adam epsilon	ϵ	10^{-5}
Encoder and Decoder		
MLP encoder sizes of task obs	—	32, 32
Encoder kernels sizes	—	4, 4, 4, 4, 4
Decoder kernels sizes	—	5, 5, 4, 5, 4
Encoder and decoder feature maps	—	32, 64, 128, 256, 512
Encoder and decoder strides	—	2, 2, 2, 2, 2
Decoder padding	—	none, 0-1, none, none, none
Data Augmentation		
Padding range	—	10
Hue delta	—	0.1
Brightness delta	—	0.4
Contrast delta	—	0.4
Saturation delta	—	0.2
Gaussina blur sigma min, max	—	0.1, 2.0
Cutout min, max	—	30, 50

Table 1. Hyper parameters of proposed ReCoRe.

3. iGibson 1.0 Training and Evaluation Splits

Phase	Scene names
Training	Beechwood_0_int, Beechwood_1_int,
	Benevolence_0_int, Benevolence_1_int, Benevolence_2_int
	Merom_0_int, Merom_1_int,
	Pomaria_0_int, Pomaria_1_int, Pomaria_2_int,
	Wainscott_0_int, Wainscott_1_int
Testing	Ihlen_0_int, Ihlen_1_int, Rs_int

Table 2. Train-test scenes splits for iGibsion 1.0 dataset.

Material category	Held-out texture ids for test
asphalt	06, 15
bricks	08, 19
concrete	06, 15, 17
fabric	01, 02, 28
fabric_carpet	02, 05, 13
ground	13, 19
leather	03, 12
marble	02, 03
metal	10, 19
metal_diamond_plate	04
moss	01, 03
paint	05
paving_stones	24, 38
planks	07, 09, 16
plaster	03
plastic	04, 05
porcelain	02, 04
rocks	04
terrazzo	06, 08
tiles	43, 49
wood	02, 05, 16, 22, 32
wood_floor	06, 10, 17, 28

Table 3. iGibson 1.0 environment held out texture ids for test.
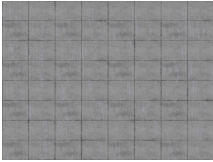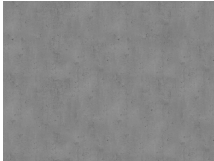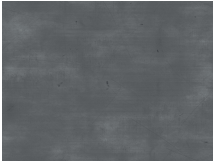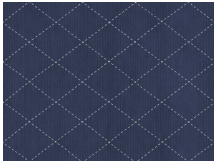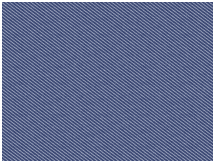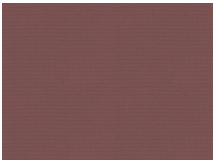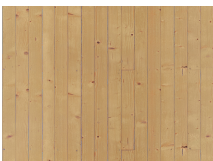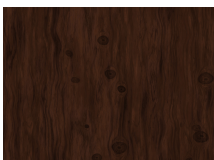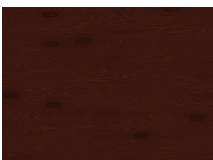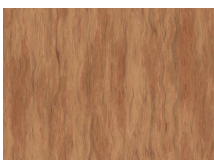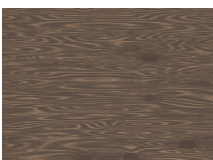
Table 4. Examples of textures from the training and testing splits of iGibson 1.0 benchmark. Note the significant variation between textures used in training and those employed in testing, which facilitates the evaluation of out-of-distribution generalization.