

IMAGE-TO-IMAGE TRANSLATION WITH CAUSAL GAN

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PREDICTING

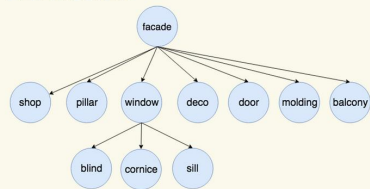
We propose applying **causal GAN** to solve image-to-image translation problems. This machinery enables sampling not only from conditional observational distributions but also from **interventional distributions**, enabling us to generate samples with desired properties that may not be present in the training set.

DATA

We used a dataset of facade images assembled at the Center for Machine Perception, which includes 606 rectified images of facades from various sources.

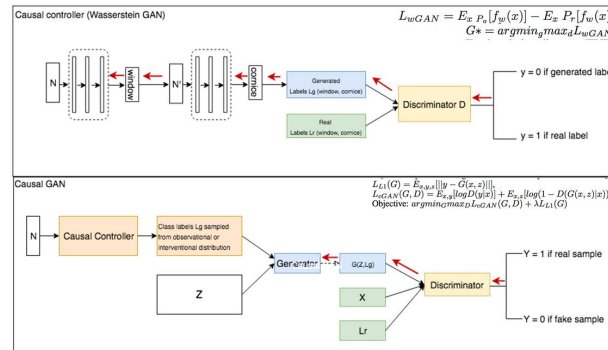
Image & annotation example	Prague, Czech Republic	Brussels, Belgium Area: Grand-Place, Lecluse, Orléans, Rome, Zagreb	Zurich, Switzerland	Barcelona, Greece, Budapest, USA
Date	2007	2007-2009	2003	2010
Resolution	0.5MPx	0.5MPx	0.5MPx	0.5 MPx
Size	213 images	99 images	177 images	177 images

FEATURES

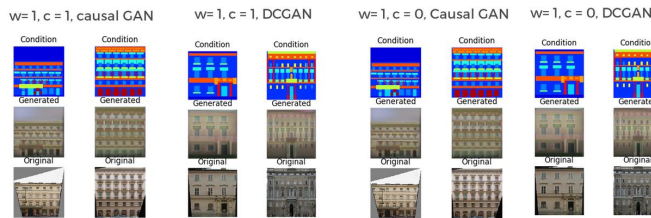


MODELS

- 1) The causal controller produce labels that are sampled from observational or interventional distributions.
- 2) A DCGAN architecture to generate images based on the labels output from the pretrained causal controller.



RESULTS



DISCUSSION

We evaluate causal GAN by comparing with DCGAN in observational and interventional settings. 4 conditions are designed and the causal graph window-> cornice was used to train causal controller.

The results from output shows that for labels that have strong causal effects, causal GAN has better performance than DCGAN. For labels that have weak or no causal effects, there is not much difference between causal GAN and DC Gan.

FUTURE WORK

- 1) explore ways to integrate causality to generative model, not only the label space.
- 2) explore situations when the causal graph is not known, or cannot be completely identified from data, or potentially is influenced by latent factors.

KEY REFERENCE

[1] Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, Alexei A. Efros. (2017) Image-to-Image translation with conditional adversarial networks. arXiv preprint arXiv:1611.07004v2

[2] Murat Kocaoglu, Christopher Snyder, Alexandros G. Dimakis, Sriram Vishwanath. (2018) CausalGAN: Learning causal implicit generative models with adversarial training arXiv preprint arXiv:1709.02023v2