SECI-GAN: Semantic and Edge Completion for dynamic objects removal

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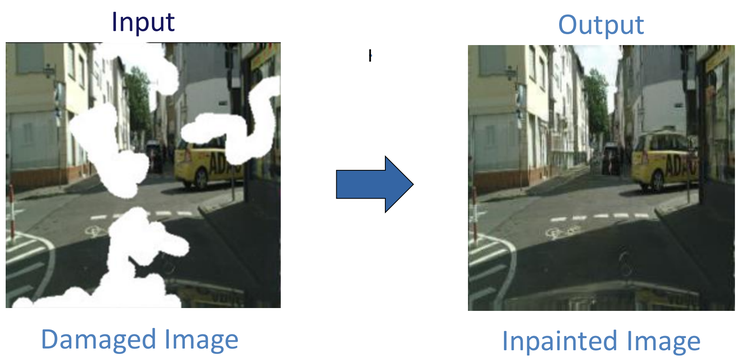
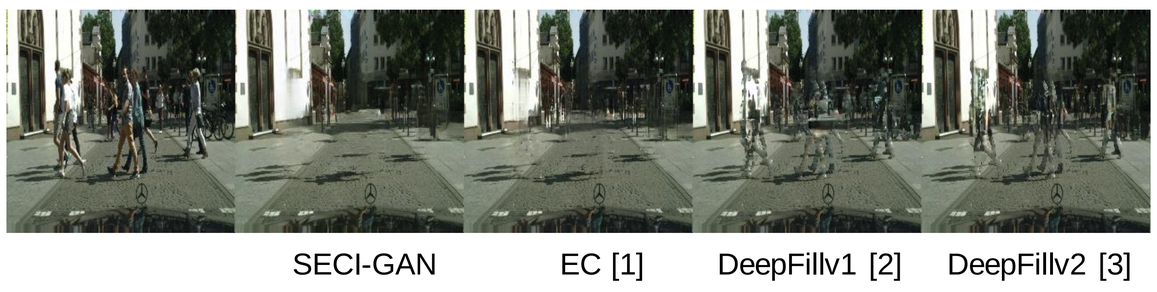
Image Inpainting for Dynamic Object Removal

Image inpainting aims at **repairing a damaged image** predicting plausible contents for the missing parts.



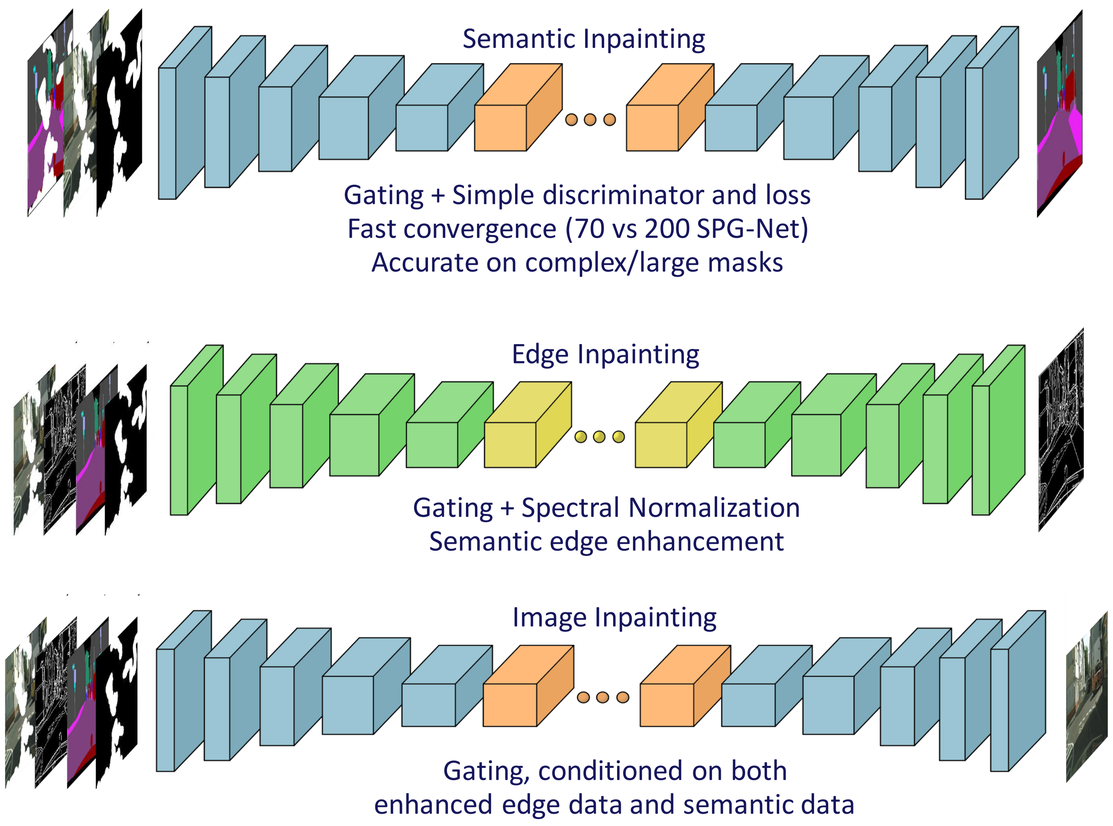
If the pixels from semantic segmentation maps of **dynamic object** are used for inpainting, it is possible to remove them.



Previous methods struggle in this scenario, especially in complex scenes.
Our method attains better performance.

Networks Architectures Details

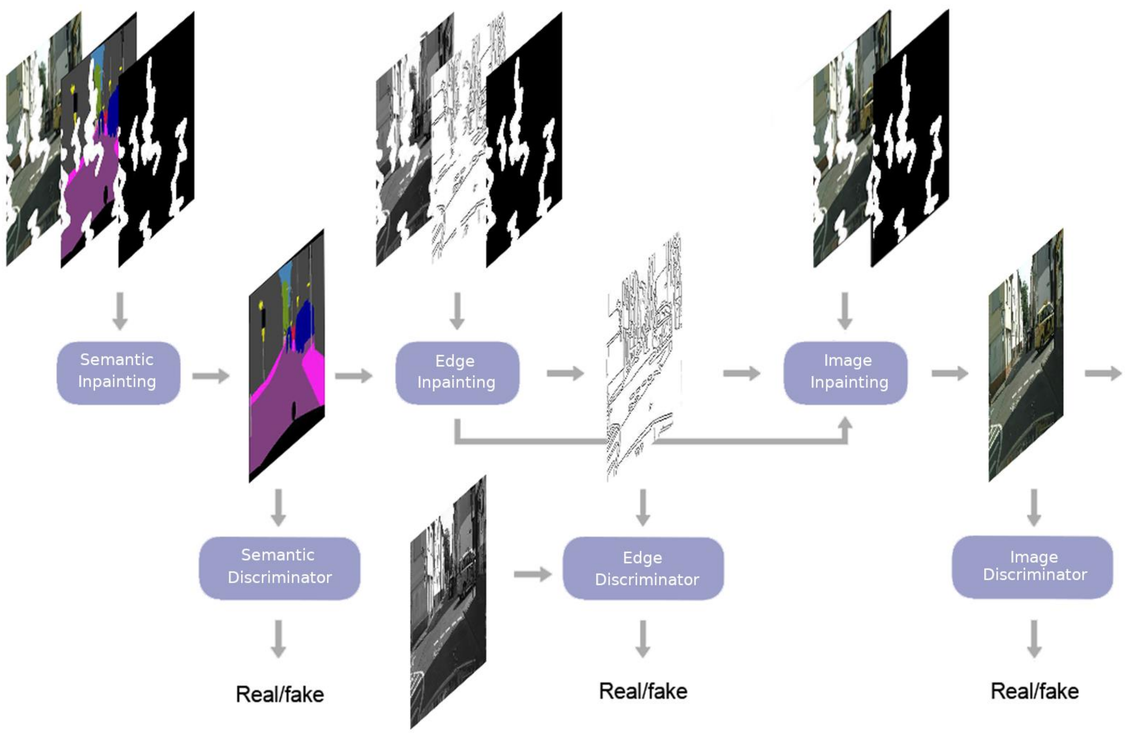
Inpainting steps GANs whose generator is made by a convolutional encoder and decoder, and whose discriminator is a SN-PatchGAN [3]



Generator's layers implement a gating mechanism [3] to differently weight hallucinated information and the uncorrupted part of the input.

Contributions

A three-step pipeline: (1) performs semantic map inpainting, (2) inpaints edge data, (3) inpaints the image conditioning on the previous



Conditioning on semantic maps suggests the coarse shape and the semantic class of objects. Conditioning on edge data suggests realistic low-level details.

Experimental results

We evaluated our model with objective metrics on increasingly complex masks of arbitrary shape:

	M_{small}				M_{medium}				M_{large}			
	EC	Ours	DF2	DF1	EC	Ours	DF2	DF1	EC	Ours	DF2	DF1
PSNR↑	32.05	**32.20**	29.75	28.30	28.81	**28.95**	26.85	25.58	24.59	**24.62**	23.24	21.21
SSIM↑	96.97	**97.09**	94.51	92.47	93.83	**94.00**	89.51	86.63	**88.95**	88.89	83.23	78.80
FID↓	12.63	**12.32**	16.34	24.45	**20.13**	20.14	26.43	30.85	31.91	**31.66**	35.20	46.08
LPIPS↓	3.60	**3.58**	5.40	7.70	6.85	**6.68**	9.24	11.66	**11.12**	11.37	13.67	16.87

We performed a user study to assess subjective quality of the inpainted images for the dynamic object removal task.

SECI-GANvsEC	>	<	=
Maj. Votes	**53**	7	0
Stat. Test	**51**	5	4

SECI-GANvsDFv1	>	<	=
Maj. Votes	**60**	0	0
Stat. Test	**59**	0	1

SECI-GANvsDFv2	>	<	=
Maj. Votes	**60**	0	0
Stat. Test	**59**	0	1

[1] K. Nazeri et al. "Edgeconnect: Structure guided image inpainting using edge prediction," Proceedings of IEEE ICCV Workshops, 2019
[2] J. Yu et al. "Generative image inpainting with contextual attention," arXiv:1801.07892, 2018
[3] J. Yu et al."Free-form image inpainting with gated convolution", IEEE ICCV 2019.