# Image Inpainting

## Traditional Methods

| **Year** | **Proceeding** | **Title** | **Comment** |
| --- | --- | --- | --- |
| 2000 | SIGGRAPH 2000 | Image Inpainting [[pdf]](http://slipguru.disi.unige.it/readinggroup/papers_vis/bertalmio00inpainting.pdf) | Diffusion-based |
| 2001 | TIP 2001 | Filling-in by joint interpolation of vector fields and gray levels [[pdf]](https://conservancy.umn.edu/bitstream/handle/11299/3462/1/1706.pdf) | Diffusion-based |
| 2001 | CVPR 2001 | Navier-stokes, ﬂuid dynamics, and image and video inpainting [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=990497) |  |
| 2001 | SIGGRAPH 2001 | Image Quilting for Texture Synthesis and Transfer [[pdf]](https://people.eecs.berkeley.edu/~efros/research/quilting/quilting.pdf) |  |
| 2001 | SIGGRAPH 2001 | Synthesizing Natural Textures [[pdf]](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.359.8241&rep=rep1&type=pdf) |  |
| 2002 | EJAM 2002 | Digital inpainting based on the mumford–shah–euler image model [[pdf]](https://www.cambridge.org/core/services/aop-cambridge-core/content/view/26ACC4694C7F064B6F40D55C09ACA9A1/S0956792502004904a.pdf/digital_inpainting_based_on_the_mumfordshaheuler_image_model.pdf) | Diffusion-based |
| 2003 | CVPR 2003 | Object removal by exemplar-based inpainting [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1211538) |  |
| 2003 | TIP 2003 | Simultaneous structure and texture image inpainting [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1217265) | Diffusion-based |
| 2003 | TIP 2003 | Structure and Texture Filling-In of Missing Image Blocks in Wireless Transmission and Compression Applications [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1197835) |  |
| 2003 | ICCV 2003 | Learning How to Inpaint from Global Image Statistics [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1238360) | Diffusion-based |
| 2003 | TOG 2003 | Fragment-based image completion [[pdf]](http://delivery.acm.org/10.1145/890000/882267/p303-drori.pdf?ip=222.195.92.10&id=882267&acc=ACTIVE%20SERVICE&key=BF85BBA5741FDC6E%2EA4F9C023AC60E700%2E4D4702B0C3E38B35%2E4D4702B0C3E38B35&__acm__=1553430113_8d3cc7f5adde2fb3894043de791d9150) | Patch-based |
| 2004 | TIP 2004 | Region Filling and Object Removal by Exemplar-Based Image Inpainting [[pdf]](https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/criminisi_tip2004.pdf) | Patch-based; Inpainting order |
| 2004 | TPAMI 2004 | Space-Time Video Completion [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1315022) |  |
| 2005 | SIGGRAPH 2005 | Image Completion with Structure Propagation [[pdf]](http://jiansun.org/papers/ImageCompletion_SIGGRAPH05.pdf) | Patch-based |
| 2006 | ISCS 2006 | Image Compression with Structure Aware Inpainting [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1692960) |  |
| 2007 | TOG 2007 | Scene completion using millions of photographs [[pdf]](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.299.518&rep=rep1&type=pdf) |  |
| 2007 | CSVT 2007 | Image Compression With Edge-Based Inpainting [[pdf]](https://www.microsoft.com/en-us/research/wp-content/uploads/2016/12/inpainting_csvt_07.pdf) | Diffusion-based |
| 2008 | CVPR 2008 | Summarizing Visual Data Using Bidirectional Similarity [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4587842) |  |
| 2009 | SIGGRAPH 2009 | PatchMatch: a randomized correspondence algorithm for structural image editing [[pdf]](http://www.faculty.idc.ac.il/arik/seminar2009/papers/patchMatch.pdf) | Patch-based |
| 2010 | TIP 2010 | Image inpainting by patch propagation using patch sparsity [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5404308) | Patch-based |
| 2011 | FTCGV 2011 | Structured learning and prediction in computer vision [[pdf]](http://pub.ist.ac.at/~chl/papers/nowozin-fnt2011.pdf) |  |
| 2011 | ICIP 2011 | Examplar-based inpainting based on local geometry [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6116441) | Inpainting order |
| 2012 | TOG 2012 | Combining inconsistent images using patch-based synthesis[[pdf]](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.364.5147&rep=rep1&type=pdf) | Patch-based |
| 2014 | TOG 2014 | Image completion using Planar structure guidance [[pdf]](https://www.microsoft.com/en-us/research/wp-content/uploads/2017/01/structure_completion_small.pdf) | Patch-based |
| 2014 | TVCG 2014 | High-Quality Real-Time Video Inpainting with PixMix [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6714519) | Video |
| 2014 | SIAM 2014 | Video inpainting of complex scenes [[pdf]](https://arxiv.org/pdf/1503.05528.pdf) | Video |
| 2015 | TIP 2015 | Annihilating Filter-Based Low-Rank Hankel Matrix Approach for Image Inpainting [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7127011) |  |
| 2015 | TIP 2015 | Exemplar-Based Inpainting: Technical Review and New Heuristics for Better Geometric Reconstructions [[pdf]](https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7056453) |  |
| 2016 | TOG 2016 | Temporally coherent completion of dynamic video [[pdf]](https://www.microsoft.com/en-us/research/wp-content/uploads/2017/01/SigAsia_2016_VideoCompletion.pdf) | Video |

## Deep-Learning-based Methods

| **Year** | **Proceeding** | **Title** | **Comment** |
| --- | --- | --- | --- |
| 2012 | NIPS 2012 | Image denoising and inpainting with deep neural networks [[pdf]](http://papers.nips.cc/paper/4686-image-denoising-and-inpainting-with-deep-neural-networks.pdf) |  |
| 2014 | GCPR 2014 | Mask-specific inpainting with deep neural networks [[pdf]](https://link.springer.com/chapter/10.1007/978-3-319-11752-2_43) |  |
| 2014 | NIPS 2014 | Deep Convolutional Neural Network for Image Deconvolution [[pdf]](http://papers.nips.cc/paper/5485-deep-convolutional-neural-network-for-image-deconvolution.pdf) |  |
| 2015 | NIPS 2015 | Shepard Convolutional Neural Networks [[pdf]](https://papers.nips.cc/paper/5774-shepard-convolutional-neural-networks.pdf) [[code]](https://github.com/jimmy-ren/vcnn_double-bladed/tree/master/applications/Shepard_CNN) |  |
| 2016 | CVPR 2016 | Context Encoders: Feature Learning by Inpainting [[pdf]](https://arxiv.org/abs/1604.07379) [[code]](https://github.com/pathak22/context-encoder) |  |
| 2016 | SIGGRAPH 2016 | High-resolution multi-scale neural texture synthesis [[pdf]](https://wxs.ca/research/multiscale-neural-synthesis/Snelgrove-multiscale-texture-synthesis.pdf) |  |
| 2017 | CVPR 2017 | Semantic image inpainting with deep generative models [[pdf]](http://openaccess.thecvf.com/content_cvpr_2017/papers/Yeh_Semantic_Image_Inpainting_CVPR_2017_paper.pdf) [[code]](https://github.com/moodoki/semantic_image_inpainting) |  |
| 2017 | CVPR 2017 | High-resolution image inpainting using multi-scale neural patch synthesis [[pdf]](http://openaccess.thecvf.com/content_cvpr_2017/papers/Yang_High-Resolution_Image_Inpainting_CVPR_2017_paper.pdf) [[code]](https://github.com/leehomyc/Faster-High-Res-Neural-Inpainting) |  |
| 2017 | CVPR 2017 | Generative Face Completion [[pdf]](http://openaccess.thecvf.com/content_cvpr_2017/papers/Li_Generative_Face_Completion_CVPR_2017_paper.pdf) [[code]](https://github.com/Yijunmaverick/GenerativeFaceCompletion) |  |
| 2017 | SIGGRAPH 2017 | Globally and Locally Consistent Image Completion [[pdf]](http://hi.cs.waseda.ac.jp/~iizuka/projects/completion/data/completion_sig2017.pdf) [[code]](https://github.com/satoshiiizuka/siggraph2017_inpainting) |  |
| 2018 | CVPR 2018 | Generative Image Inpainting with Contextual Attention [[pdf]](https://arxiv.org/abs/1801.07892) [[code]](https://github.com/JiahuiYu/generative_inpainting) |  |
| 2018 | CVPR 2018 | Natural and Effective Obfuscation by Head Inpainting [[pdf]](http://openaccess.thecvf.com/content_cvpr_2018/papers/Sun_Natural_and_Effective_CVPR_2018_paper.pdf) |  |
| 2018 | CVPR 2018 | Eye In-Painting With Exemplar Generative Adversarial Networks [[pdf]](http://openaccess.thecvf.com/content_cvpr_2018/papers/Dolhansky_Eye_In-Painting_With_CVPR_2018_paper.pdf) [[code]](https://github.com/bdol/exemplar_gans) |  |
| 2018 | CVPR 2018 | UV-GAN: Adversarial Facial UV Map Completion for Pose-invariant Face Recognition [[pdf]](http://openaccess.thecvf.com/content_cvpr_2018/papers/Deng_UV-GAN_Adversarial_Facial_CVPR_2018_paper.pdf) |  |
| 2018 | CVPR 2018 | Disentangling Structure and Aesthetics for Style-aware Image Completion [[pdf]](http://openaccess.thecvf.com/content_cvpr_2018/papers/Gilbert_Disentangling_Structure_and_CVPR_2018_paper.pdf) |  |
| 2018 | ECCV 2018 | Image Inpainting for Irregular Holes Using Partial Convolutions [[pdf]](https://arxiv.org/pdf/1804.07723.pdf) [[code]](https://github.com/NVIDIA/partialconv) |  |
| 2018 | ECCV 2018 | Contextual-based Image Inpainting: Infer, Match, and Translate [[pdf]](https://arxiv.org/pdf/1711.08590.pdf) |  |
| 2018 | ECCV 2018 | Shift-Net: Image Inpainting via Deep Feature Rearrangement [[pdf]](https://arxiv.org/pdf/1801.09392v2.pdf) [[code]](https://github.com/Zhaoyi-Yan/Shift-Net) |  |
| 2018 | NIPS 2018 | Image Inpainting via Generative Multi-column Convolutional Neural Networks [[pdf]](https://arxiv.org/pdf/1810.08771.pdf) [[code]](https://github.com/shepnerd/inpainting_gmcnn) |  |
| 2018 | TOG 2018 | Faceshop: Deep sketch-based face image editing [[pdf]](https://arxiv.org/pdf/1804.08972.pdf) |  |
| 2018 | ACM MM 2018 | Structural inpainting [[pdf]](https://arxiv.org/pdf/1803.10348.pdf) |  |
| 2018 | ACM MM 2018 | Semantic Image Inpainting with Progressive Generative Networks [[pdf]](https://dl.acm.org/citation.cfm?id=3240625) [[code]](https://github.com/crashmoon/Progressive-Generative-Networks) |  |
| 2018 | BMVC 2018 | SPG-Net: Segmentation Prediction and Guidance Network for Image Inpainting [[pdf]](https://arxiv.org/pdf/1805.03356.pdf) |  |
| 2018 | BMVC 2018 | MC-GAN: Multi-conditional Generative Adversarial Network for Image Synthesi [[pdf]](https://arxiv.org/pdf/1805.01123.pdf) [[code]](https://github.com/HYOJINPARK/MC_GAN) |  |
| 2018 | ACCV 2018 | Face Completion iwht Semantic Knowledge and Collaborative Adversarial Learning [[pdf]](https://arxiv.org/pdf/1812.03252.pdf) |  |
| 2018 | ICASSP 2018 | Edge-Aware Context Encoder for Image Inpainting [[pdf]](http://mirlab.org/conference_papers/International_Conference/ICASSP%202018/pdfs/0003156.pdf) |  |
| 2018 | ICPR 2018 | Deep Structured Energy-Based Image Inpainting [[pdf]](https://arxiv.org/pdf/1801.07939.pdf) [[code]](https://github.com/cvlab-tohoku/DSEBImageInpainting) |  |
| 2018 | AISTATS 2019 | Probabilistic Semantic Inpainting with Pixel Constrained CNNs [[pdf]](https://arxiv.org/pdf/1810.03728.pdf) |  |
| 2019 | ICRA 2019 | Empty Cities: Image Inpainting for a Dynamic-Object-Invariant Space [[pdf]](https://arxiv.org/pdf/1809.10239.pdf) |  |
| 2019 | AAAI 2019 | Video Inpainting by Jointly Learning Temporal Structure and Spatial Details [[pdf]](https://arxiv.org/pdf/1806.08482.pdf) | Video |
| 2019 | CVPR 2019 | Pluralistic Image Completion [[pdf]](https://arxiv.org/pdf/1903.04227.pdf) [[code]](https://github.com/lyndonzheng/Pluralistic) [[project]](http://www.chuanxiaz.com/publication/pluralistic/?tdsourcetag=s_pctim_aiomsg) |  |
| 2019 | CVPR 2019 | Deep Reinforcement Learning of Volume-guided Progressive View Inpainting for 3D Point Scene Completion from a Single Depth Image [[pdf]](https://arxiv.org/pdf/1903.04019.pdf) |  |
| 2019 | CVPR 2019 | Foreground-aware Image Inpainting [[pdf]](https://arxiv.org/pdf/1901.05945.pdf) |  |
| 2019 | CVPR 2019 | Privacy Protection in Street-View Panoramas using Depth and Multi-View Imagery [[pdf]](https://arxiv.org/pdf/1903.11532.pdf) |  |
| 2019 | CVPR 2019 | Learning Pyramid-Context Encoder Network for High-Quality Image Inpainting [[pdf]](https://arxiv.org/pdf/1904.07475.pdf) [[code]](https://github.com/researchmm/PEN-Net-for-Inpainting) |  |
| 2019 | CVPR 2019 | Deep Flow-Guided Video Inpainting [[pdf]](https://arxiv.org/pdf/1905.02884.pdf) [[project]](https://nbei.github.io/video-inpainting.html) | Video |
| 2019 | CVPR 2019 | Deep video inapinting [[pdf]](https://arxiv.org/pdf/1905.01639.pdf) | Video |
| 2019 | CVPR Workshop 2019 | VORNet: Spatio-temporally Consistent Video Inpainting for Object Removal [[pdf]](https://arxiv.org/pdf/1904.06726) | Video |
| 2019 | TNNLS 2019 | PEPSI++: Fast and Lightweight Network for Image Inpainting [[pdf]](https://arxiv.org/pdf/1905.09010.pdf) |  |
| 2019 | IJCAI 2019 | MUSICAL: Multi-Scale Image Contextual Attention Learning for Inpainting [[pdf]](https://www.ijcai.org/proceedings/2019/0520.pdf) |  |
| 2019 | IJCAI 2019 | Generative Image Inpainting with Submanifold Alignment [[pdf]](https://arxiv.org/pdf/1908.00211.pdf) |  |
| 2019 | ACM MM 2019 | Progressive Image Inpainting with Full-Resolution Residual Network [[pdf]](https://arxiv.org/pdf/1907.10478.pdf) [[code]](https://github.com/ZongyuGuo/Inpainting_FRRN) |  |
| 2019 | ACM MM 2019 | Deep Fusion Network for Image Completion [[pdf]](https://arxiv.org/pdf/1904.08060.pdf) [[code]](https://github.com/hughplay/DFNet) |  |
| 2019 | ACM MM 2019 | GAIN: Gradient Augmented Inpainting Network for Irregular Holes [[pdf]](https://dl.acm.org/citation.cfm?id=3350912) |  |
| 2019 | ACM MM 2019 | Single-shot Semantic Image Inpainting with Densely Connected Generative Networks [[pdf]](https://dl.acm.org/citation.cfm?id=3350903) |  |
| 2019 | ICCVW 2019 | EdgeConnect: Generative Image Inpainting with Adversarial Edge Learning [[pdf]](https://arxiv.org/pdf/1901.00212.pdf) [[code]](https://github.com/knazeri/edge-connect) |  |
| 2019 | ICCV 2019 | Coherent Semantic Attention for Image Inpainting [[pdf]](https://arxiv.org/pdf/1905.12384.pdf) [[code]](https://github.com/KumapowerLIU/CSA-inpainting) |  |
| 2019 | ICCV 2019 | StructureFlow: Image Inpainting via Structure-aware Appearance Flow [[pdf]](https://arxiv.org/pdf/1908.03852.pdf) [[code]](https://github.com/RenYurui/StructureFlow) |  |
| 2019 | ICCV 2019 | Progressive Reconstruction of Visual Structure for Image Inpainting [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Li_Progressive_Reconstruction_of_Visual_Structure_for_Image_Inpainting_ICCV_2019_paper.pdf) [[code]](https://github.com/jingyuanli001/PRVS-Image-Inpainting) |  |
| 2019 | ICCV 2019 | Localization of Deep Inpainting Using High-Pass Fully Convolutional Network [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Li_Localization_of_Deep_Inpainting_Using_High-Pass_Fully_Convolutional_Network_ICCV_2019_paper.pdf) |  |
| 2019 | ICCV 2019 | Image Inpainting with Learnable Bidirectional Attention Maps [[pdf]](https://arxiv.org/pdf/1909.00968.pdf) [[code]](https://github.com/Vious/LBAM_inpainting) |  |
| 2019 | ICCV 2019 | Free-Form Image Inpainting with Gated Convolution [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Yu_Free-Form_Image_Inpainting_With_Gated_Convolution_ICCV_2019_paper.pdf) [[project]](http://jiahuiyu.com/deepfill2/) |  |
| 2019 | ICCV 2019 | FiNet: Compatible and Diverse Fashion Image Inpainting [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Han_FiNet_Compatible_and_Diverse_Fashion_Image_Inpainting_ICCV_2019_paper.pdf) | Fashion |
| 2019 | ICCV 2019 | SC-FEGAN: Face Editing Generative Adversarial Network with User’s Sketch and Color [[pdf]](https://arxiv.org/pdf/1902.06838.pdf) [[code]](https://github.com/JoYoungjoo/SC-FEGAN) | Face |
| 2019 | ICCV 2019 | Human Motion Prediction via Spatio-Temporal Inpainting [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Hernandez_Human_Motion_Prediction_via_Spatio-Temporal_Inpainting_ICCV_2019_paper.pdf) [[code]](https://github.com/magnux/MotionGAN) | Motion |
| 2019 | ICCV 2019 | Copy-and-Paste Networks for Deep Video Inpainting [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Lee_Copy-and-Paste_Networks_for_Deep_Video_Inpainting_ICCV_2019_paper.pdf) | Video |
| 2019 | ICCV 2019 | Free-form Video Inpainting with 3D Gated Convolution and Temporal PatchGAN [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Chang_Free-Form_Video_Inpainting_With_3D_Gated_Convolution_and_Temporal_PatchGAN_ICCV_2019_paper.pdf) [[code]](https://github.com/amjltc295/Free-Form-Video-Inpainting) | Video |
| 2019 | ICCV 2019 | An Internal Learning Approach to Video Inpainting [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Zhang_An_Internal_Learning_Approach_to_Video_Inpainting_ICCV_2019_paper.pdf) | Video |
| 2019 | ICCV 2019 | Vision-Infused Deep Audio Inpainting [[pdf]](http://openaccess.thecvf.com/content_ICCV_2019/papers/Zhou_Vision-Infused_Deep_Audio_Inpainting_ICCV_2019_paper.pdf) [[code]](https://github.com/Hangz-nju-cuhk/Vision-Infused-Audio-Inpainter-VIAI) | Audio |
| 2019 | AAAI 2020 | Region Normalization for Image Inpainting [[pdf]](https://arxiv.org/abs/1911.10375) [[code]](https://github.com/geekyutao/RN) |  |