Image inpainting in remote sensing

Santiago Passos and Alejandro Rojas Benítez

Universidad EAFIT
Mathematical Engineering

Satellite Images

Table 1: Landsat 8 Bands.

Band	**Name**	**Wavelength**	**Pixel Size**
1	Visible	0.43 - 0.45 μ m	30 m
2	Visible	0.45 - 0.51 μ m	30 m
3	Visible	0.53 - 0.59 μ m	30 m
4	Red	0.64 - 0.67 μ m	30 m
5	Near - Infrared	0.85 - 0.88 μ m	30 m
6	SWIR 1	1.57 - 1.65 μ m	30 m
7	SWIR 2	2.11 - 2.29 μ m	30 m
8	PAN	0.50 - 0.68 μ m	30 m
9	Cirrus	1.36 - 1.38 μ m	30 m

Normalized difference vegetation index

Figure 1: NDVI for Medellín from a Landsat 8 image from December 2017.

Presence of Clouds in Remote Sensing

Figure 2: Antioquia Landsat 8 image from October 2016.

Inpainting

Figure 3: Example of an image with a mask.

Architecture

Figure 4: U-net architecture (Ronneberger *et al.* , 2015).

Results

Figure 5: Results 1

Results

Figure 6: Results 2

Results

Figure 7: Results 3

Results

Figure 8: Results 4

Results

Figure 9: Results 5

Results

Figure 10: Results 6

Results

Figure 11: Results 7

References I

Bertalmio, M., Bertozzi, A. L., & Sapiro, G. 2001. Navier-stokes, fluid dynamics, and image and video inpainting. **1**(Dec), I–I.

Charlie Loyd. 2013. Putting Landsat 8's Bands to Work.

Janarthanan, V., & Jananii, G. 2012. A Detailed Survey on Various Image Inpainting Techniques. *Bonfring International Journal of Advances in Image Processing*, **2**(2), 01–03.

Liu, Guilin, Reda, Fitsum, Shih, Kevin, Wang, Ting-Chun, Tao, Andrew, & Catanzaro, Bryan. 2018. Image Inpainting for Irregular Holes Using Partial Convolutions. 04.

Ronneberger, Olaf, Fischer, Philipp, & Brox, Thomas. 2015. U-Net: Convolutional Networks for Biomedical Image Segmentation. 234–241.

Telea, Alexandru. 2004. An Image Inpainting Technique Based on the Fast Marching Method. *Journal of Graphics Tools*, **9**(01).