



COLORADOVIEW 2019 - 2020

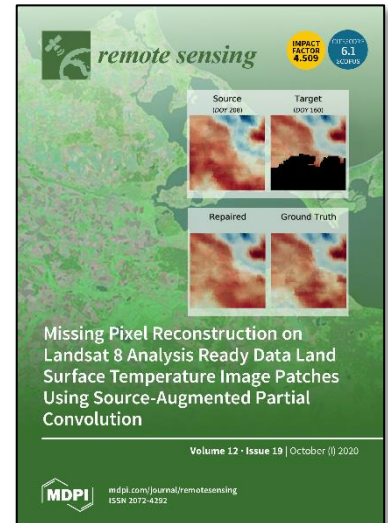


COLORADOVIEW 2019 - 2020 ACTIVITIES

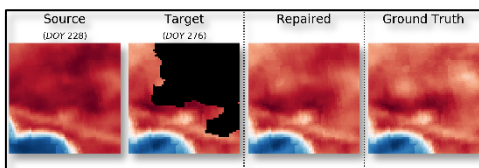
Satellite images may contain missing pixels due to poor atmospheric conditions like thick cloud cover or satellite sensor malfunctioning like the Landsat 7 scan line corrector (SLC) failure. This affects the image analysis and applications. An area of active remote sensing research is attempting to develop algorithms and models in order to reconstruct missing pixels in satellite images using another collocated complete imagery.

One of ColoradoView GY19 HIAs is to develop a deep learning algorithm for solving the issue. Unlike traditional methods, the deep learning approach is data driven, which learns the “rules” of missing pixel reconstruction from millions of training samples and requires no prior human knowledge of these “rules.” Using Landsat 8 Analysis Ready Data (ARD) Land Surface Temperature product as an example, we generated the training samples, each comprises a (corrupted) target image and a collocated (complete) source image. With the improved partial convolution framework accommodating the source images, the trained model outperforms the baseline models by 7-59% in terms of nine validation metrics.

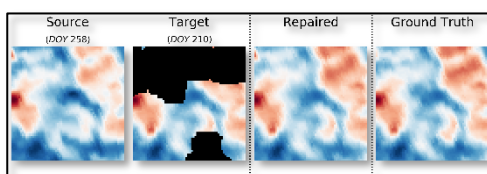
ColoradoView scientists and a student intern contributed to the work. The work is published in the *Remote Sensing* journal and selected to appear on the cover of the October (I) 2020 issue (<https://www.mdpi.com/2072-4292/12/19>).



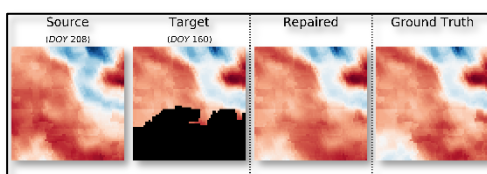
Remote Sensing selects the missing pixel reconstruction paper as the cover story for the October (I) 2020 issue.



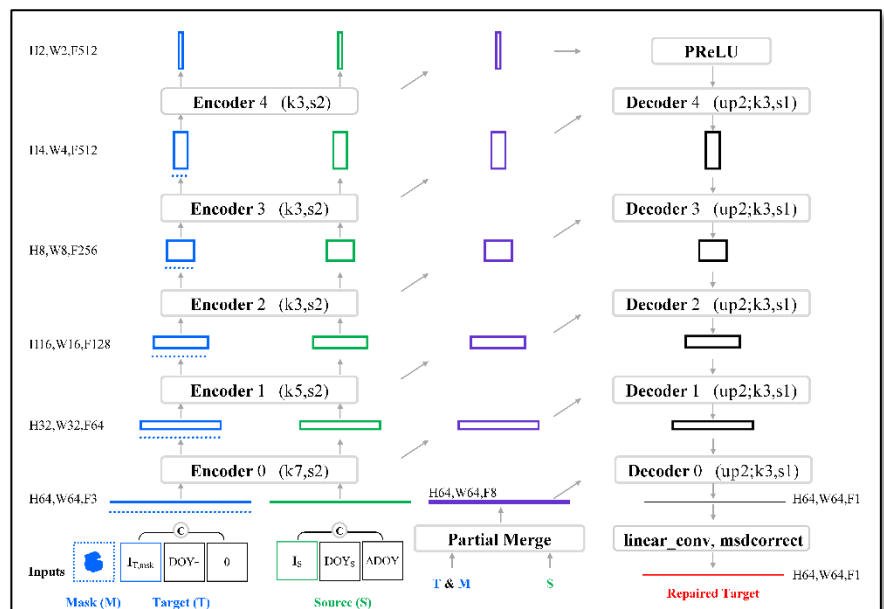
Missing pixel reconstruction result (Case 1)



Missing pixel reconstruction result (Case 2)



Missing pixel reconstruction result (Case 3)



The overall architecture of the proposed Source Augmented Partial Convolution v2 (SAPC2) model for missing pixel reconstruction.

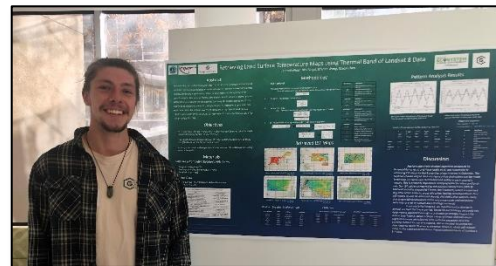
ColoradoView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



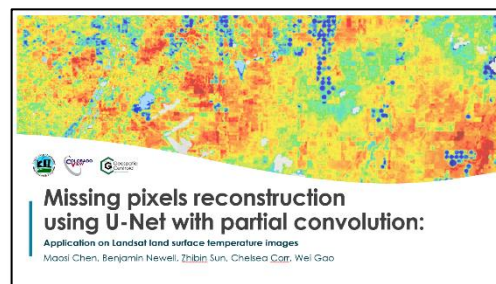
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BENEFITS TO COLORADO

- Provided student interns the opportunity to engage in actual research projects, through which they learned
 - the retrieval and analysis of Remote Sensing variables using Google Earth Engine scripts;
 - state-of-the-art machine learning, especially deep learning techniques; and
 - how to write summary reports and present findings for scientific investigations.
- Developed the deep learning algorithm to fill gaps of Remote Sensing images with the help of another collocated complete image. This work could be used to recover the cloud block regions in remote sensing images for Colorado or any place on Earth.
- Promoted Remote Sensing research through poster and oral presentations at Colorado State University and international conferences.



Nick Vogel, a former ColoradoView student intern, presented the LST retrieval and pattern analysis work on GIS day (November 13, 2019) in Morgan library, Colorado State University, Fort Collins.



Benjamin Newell, a former ColoradoView student intern, presented the missing pixel reconstruction work at the AmericaView monthly meeting in July 2020.

COLORADOVIEW CONSORTIUM MEMBERSHIP



Federal consortium members identified above do not receive funding from AmericaView.

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