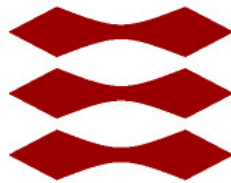


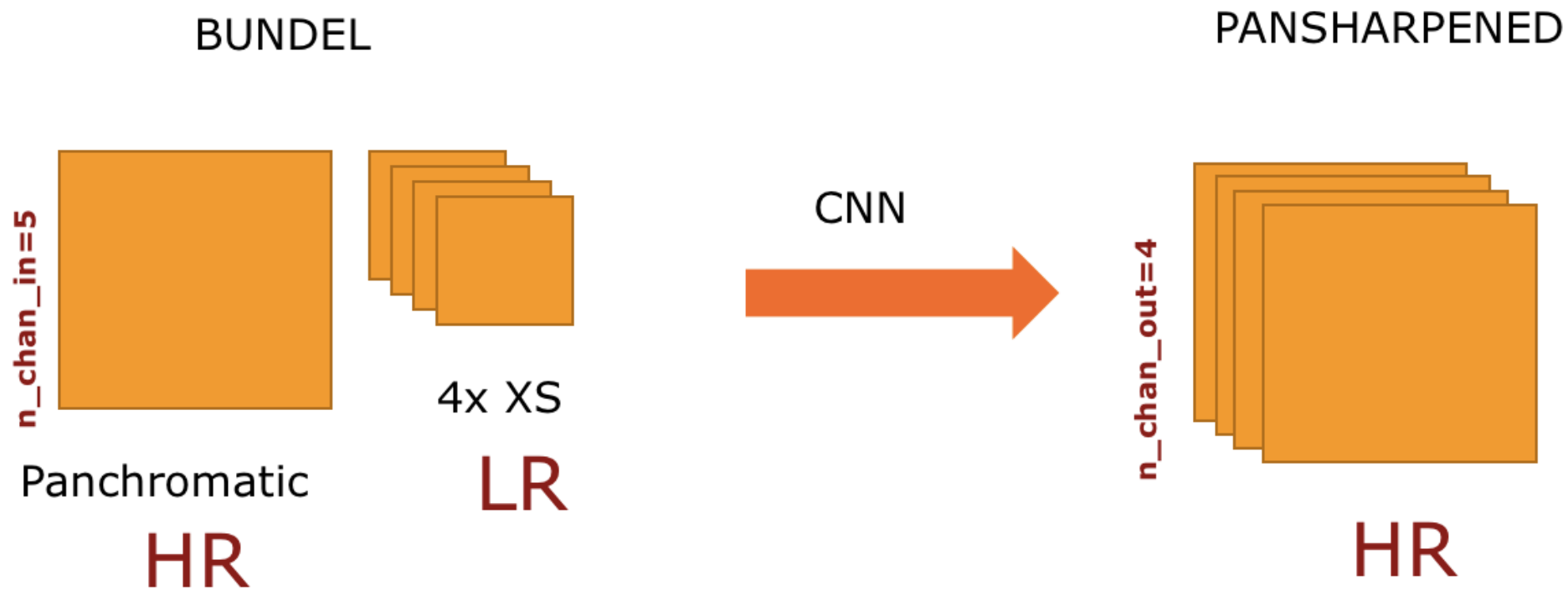
From Low Resolution to High Resolution Sattelite
images using deep learning methods

THALES

DTU



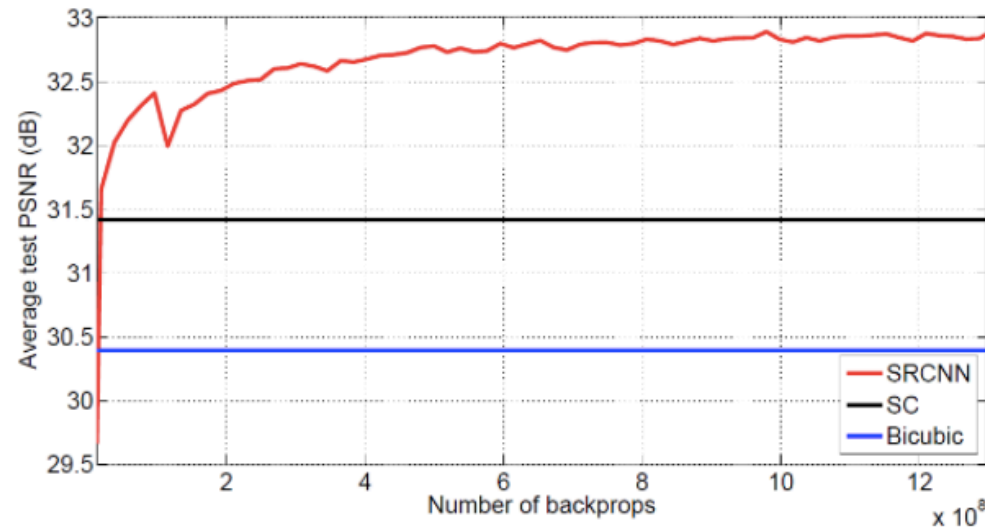
Challenging Fusion algorithm with deep learning method



Litterature involved

SRCNN: Image Super-Resolution Using Deep Convolutional Networks

Chao Dong, Chen Change Loy, Kaiming He, Xiaoou Tang



The proposed Super-Resolution Convolutional Neural Network (SRCNN) surpasses the bicubic baseline with just a few training iterations, and outperforms the sparse-coding-based method (SC) with moderate training. The performance may be further improved with more training iterations.

Simple Network but different problem → SRCNN works at reconstructing from RGB low resolution image to RGB high resolution image so they have different input than our problem.

Results



Estimated Pansharpened



True Pansharpened

Conclusion and discussion

Improvements methods tested: data augmentation, network size, batch size, dropout, initial learning rate, early stopping

However, none of them brought striking improvements. The main issue is that a blue hue seems to pollute the whole image and no method makes it disappear.

Preprocessing of the data: a great part of the project was focusing on pre processing and building the training et test sets. Documentation and scripts are available.

Development chain checked: the goal of this project was for the student to be able to develop an algorithm deployable and reusable for Thales, with clean documentation and checkpoints all along the project, that makes it safe to be conducted and reliable.

Comparison with traditional method: No time measurement of training and prediction have been considered and no comparison with Thales fusion algorithm either. It would definitely be interesting to conduct this survey.

Discovering another method: EnhanceNet, paper published on 30/07/2017 seems to bring another method on the table that could really be interesting to consider (see next slide)

EnhanceNet

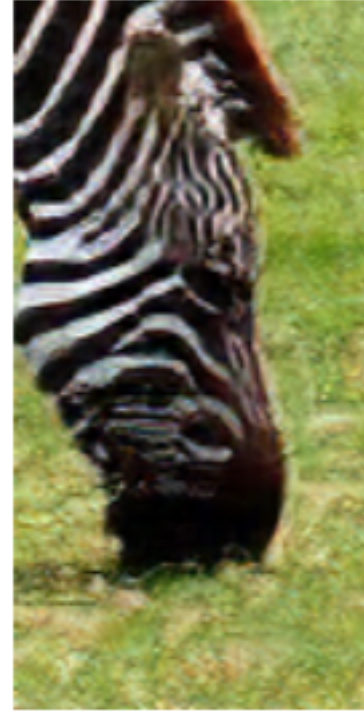
EnhanceNet: Single Image Super-Resolution Through Automated Texture Synthesis
Mehdi S. M. Sajjadi, Bernhard Schölkopf, Michael Hirsch

- EnhanceNet has again (like for SRCNN) different input than our problem.
- No direct implementation is available, only pretrained network which is problematic considering the type of input (see report for details). The network doesn't seem to be easy to implement.
- The main issue is color retrieval with SRCNN not sharpness, but EnhanceNet seems to handle better color shift than SRCNN (see report for details)



SRCNN [8]

SRCNN



ENet-PAT

EnhanceNet



I_{HR}

High resolution
image

- EnhanceNet gives sharp results.
- The network is quick to predict.