Robosat: an Open Source and efficient Semantic Segmentation Toolbox for Aerial Imagery

@o_courtin
RoboSat

Generic ecosystem for QoD and feature extraction from aerial and satellite imagery

https://github.com/mapbox/robosat
https://github.com/datapink/robosat
State of Art SemSeg
Industrial standards code design and written
Highly modular and quite extensible
OSM and MapBox ecosystem integration
PyTorch based
Licence MIT
Neurons
Network
Data
Labels
Weights
Loss Function
Neurons
Network

Data

Labels

Weights

Loss Function
Figure 2. TemausNetV2: encoder-decoder network with skipped connections that has ABN WideResnet-38 as the encoder. As an input, we have RGB + extra channels image. B1-B5 are the first five convolutional blocks of the base network that was pre-trained on the ImageNet. At every step of the decoder block, we perform upsampling, followed by the series of the convolution layers. Skip connections are added between convolution blocks in the encoder and the decoder of the corresponding size. In the end, 1x1 convolution is added to reduce the number of channels to the desired two, one for the binary mask and another one for touching instances.

MultiBands and Fusion

Multi spectral imagery or any (related) vector rasterization
Neurons
Network
Data
Labels
Weights
Loss Function
<table>
<thead>
<tr>
<th>Image</th>
<th>Label</th>
<th>Cross Entropy</th>
<th>mIoU</th>
<th>Lovasz</th>
</tr>
</thead>
</table>

https://arxiv.org/abs/1705.08790
Weights

ImageNet pre-trained
Resume Training
Export ONNX
Grand Lyon OpenData use case
## RoboSat Timeline

<table>
<thead>
<tr>
<th>Month</th>
<th>Version</th>
<th>Feature</th>
<th>Contributors</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>v 1.0.0</td>
<td>Initial release</td>
<td>daniel-j-h, bkwoshik</td>
</tr>
<tr>
<td>September</td>
<td>v 1.1.0</td>
<td>Increase Training perfs</td>
<td>Jesse-jApps, ocourtin</td>
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<tr>
<td>October</td>
<td>master</td>
<td>OSM Roads extraction</td>
<td>DragonEmperorG</td>
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<td></td>
<td></td>
<td>mIoU and Lovasz losses</td>
<td>ocourtin</td>
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<tr>
<td>November</td>
<td>PR 138</td>
<td>Multibands and tools stuff</td>
<td>ocourtin</td>
</tr>
</tbody>
</table>

Code reviewer since ever: daniel-j-h :)
#1 Predict performance improvement

#2 Lower resolution Imagery SemSeg: Sentinel-2 or PlanetLab

#3 Feature extraction
#1 Predict performance improvement

- PyTorch 1.0 JIT
- CUDA 10 FP 16 models
- ONNX export to high performance env (Caffe2 / Microsoft ?)
- Lighter models
#2 Lower resolution Imagery SemSeg: Sentinel-2 or PlanetLab

- Improve again Fusion and Topological Losses

- SuperPixel resolution
#3 Feature extraction

- Generic feature post treatment. Explore GAN
Predict performance improvement

Lower resolution Imagery SemSeg: Sentinel-2 or PlanetLab

Feature extraction
Industrial state of art Aerial SemSeg available, and playful

Data are also available

Decent OpenDataSet is a bottle neck

Predict speed performances had to been improve to scale at large
@data_pink expertise, core dev and solutions:

Computer Vision

NLP

TimeSeries

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Computer Vision

NLP

TimeSeries

Coming conf, 05/12 @OSS_Paris: NLP State of Art

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