# CDNeXt: Remote Sensing Image Change Detection Based on Temporospatial Interactive Attention Module

A PyTorch 1.8 implementation of CDNeXt with the TIAM and different backbone

- The CDNeXt framework:

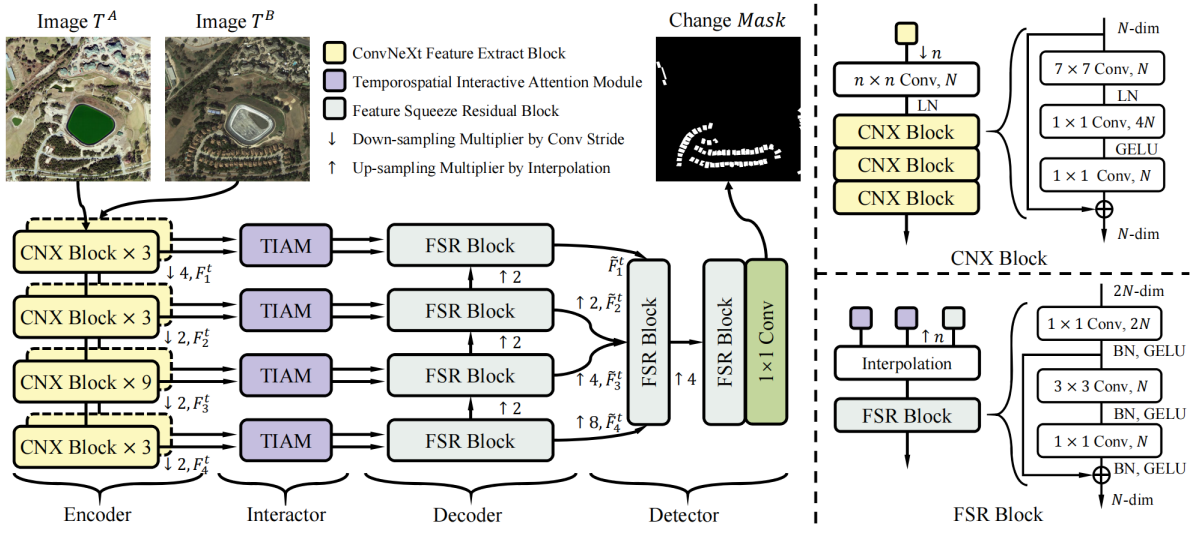
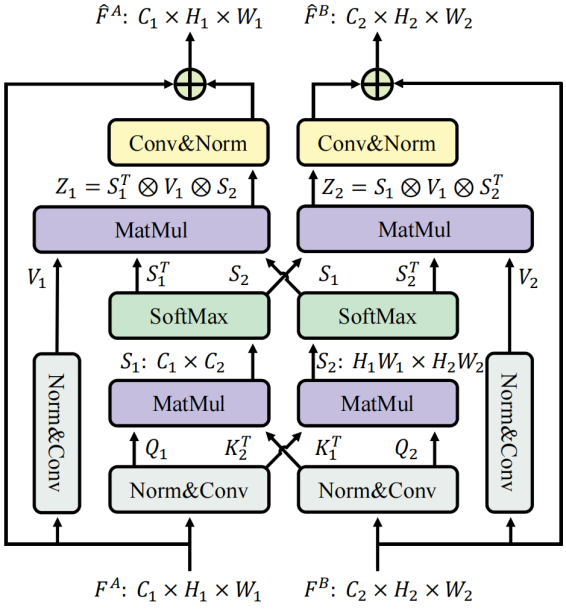



Figure 2. The schematic illustration of our proposed CDNeXt. The framework sequentially executes four sub-modules: Encoder, Interactor, Decoder, and Detector. The right part shows the base modules, CNX block in Encoder, and FSR block in Decoder.

- The Temporospatial Interactive Attention Module (TIAM):




# Requirements

1. Python >= 3.7

2. PyTorch >= 1.8.2
3. torchvision >=0.9.2
4. numpy
5. opencv-python
6. matplotlib
7. tqdm
8. prettytable
9. pillow

# Usage

# 0. Data Preparation

All image data are sliced to 256×256 pixels. The datasets are placed in the "datasets" folder and organized as follows:

```
datasets
    ├─LEVIR-CD+
    |    ├─train
    |    |    ├─T1
    |    |    ├─T2
    |    |    └─label
    |    └─test
    |         ├─T1
    |         ├─T2
    |         └─label
    ├─S2Looking
    |    └─...
    ├─SYSU-CD
    |    └─...
    └─...
```

# 1. Training

In the *train.py* file, you can set the variable *backboneName* to use another backbone network:

```
backboneName = "tiny" #'tiny','small','base','resnet18'
```

In the *cdnext.py* file, you can set the variable *isTemporalAttention* to use Temporospatial Interactive Attentive Module (TIAM) in which encoder layers, The other variables are in the **init** function as well.

*self.SpatiotemporalAttentionModule* sets which TIAM module is enabled.

```
isTemporalAttention = [1,2,3,4]
# or [0,1,2,3] uses last 3 layers in Bi-features.
isCBAM=[0,0,0,0]
isNonlocal=[0,0,0,0]
self.SpatiotemporalAttentionModule = SpatiotemporalAttentionFull
#SpatiotemporalAttentionBase  SpatiotemporalAttentionFull  SpatiotemporalAttentionFullNotWeightS
```

train CDNeXt model like this:

> python train.py

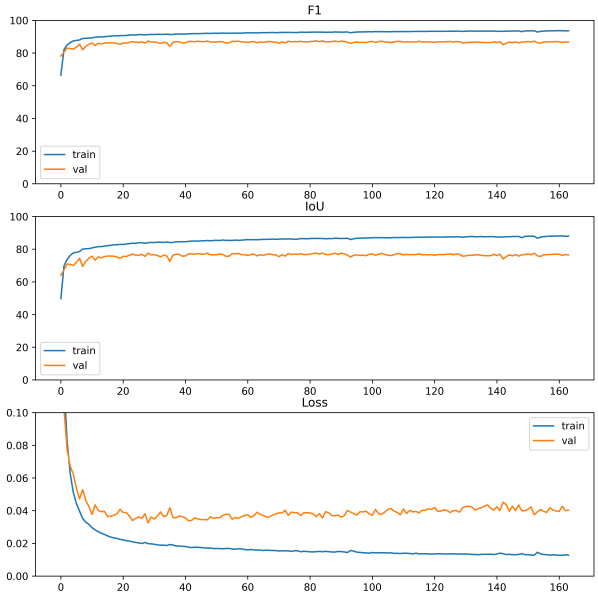
## 2. Test

In the *test.py* file, you can set the variable *model_path* to use trained model, run eval process like this:

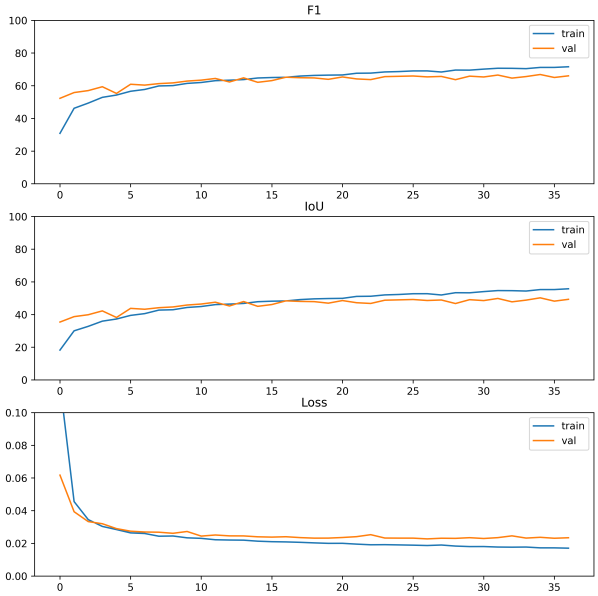
> python eval.py

## Experiments

Performance changes of the main metrics during the training process. LEVIR-CD+ results and S2Looking results, respectively.




LEVIR-CD+ results




S2Looking resultsg