Disaster Management Alert

Using CNN and cocept of DL

Theme Introduction

- In the recent decades, disaster detection has been one of the major interesting research subjects due to the great lost of human lives after disaster occurred. Researchers have studied the effect of changes occurred due to disaster using sensors and simple image processing techniques .

- Previous research findings show that disaster detection systems have a few major problems, which includes observing occurrence of disaster in limited range. This is due to limited amount of disaster detection sensor and gets information through verbal hence has low accuracy.

- Furthermore, operators also face difficulty in disaster detection due to massive amount of satellite images to be observed in short period of time. Hence, this may lead to misjudgment or overlook of occurrence of disaster.

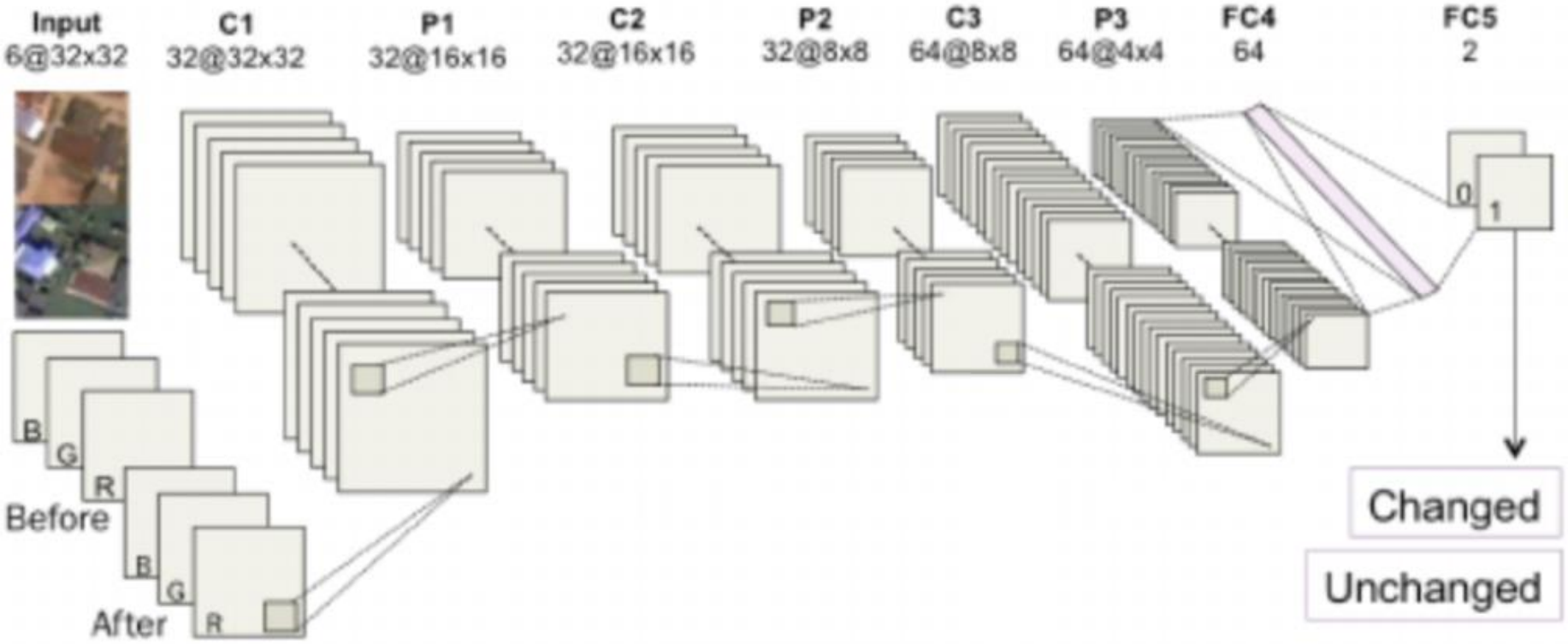
Methodology

- We are making our project under the category “AI for disaster management” . We will take pre and post sattelite images of disaster area.
- Aerial images (pre-disaster and post-disaster images) with same spatial information but different time series information regarded to landslide and flood are taken directly from Google Earth as input images.
- By using CNN (one maxpool layer and two fully connected layer) , we will predict the kinematics of the disaster and provide alertness to the nearest area.
- Disaster detection system proposed by our system consists of 2 phase; train phase and test phase.

Train and Test Phase

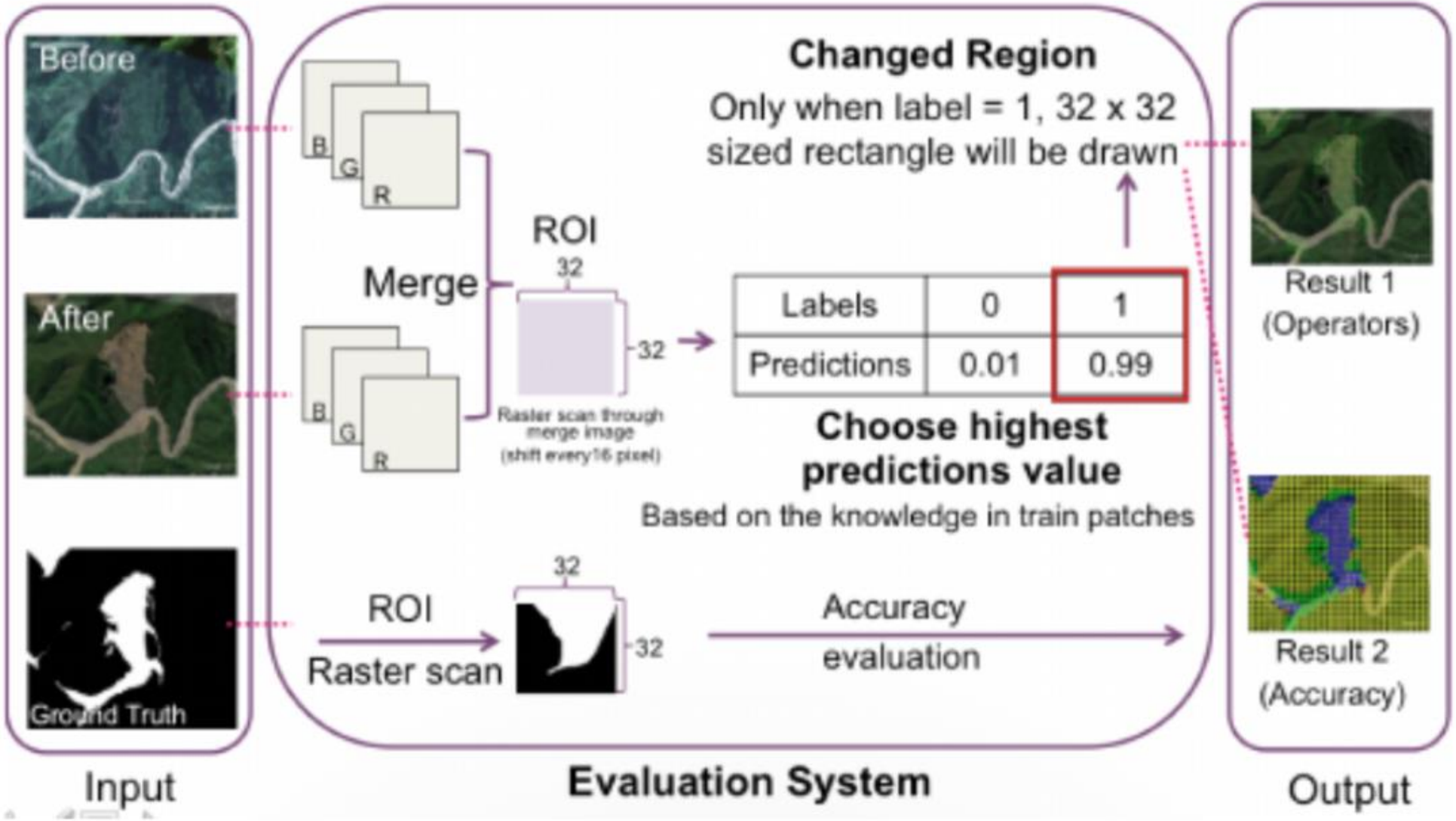
- This phase focus on learning all possible pattern of disasters specially landslide and flood using CNN as a database needed for disaster detection in the test phase.
- First, we create training patches by trimming pre-disaster, post-disaster and ground truth images of each scene into 32x32 pixels sized patches. Training patches of pre-disaster and post-disaster from same position are combined. Then, each combined training patches are compared with ground truth patches.
- Next, we label the training patches as 0 or 1. 0 means change occurred or disaster occurred. When change rate is less than or equal to 10%, it is labeled as 0. On the other hand, when change rate is more than 10%, it is labeled as 1.
- All training patched and labels, which are saved in text file, are trained by CNN to get disaster features

CNN model (basic architecture)

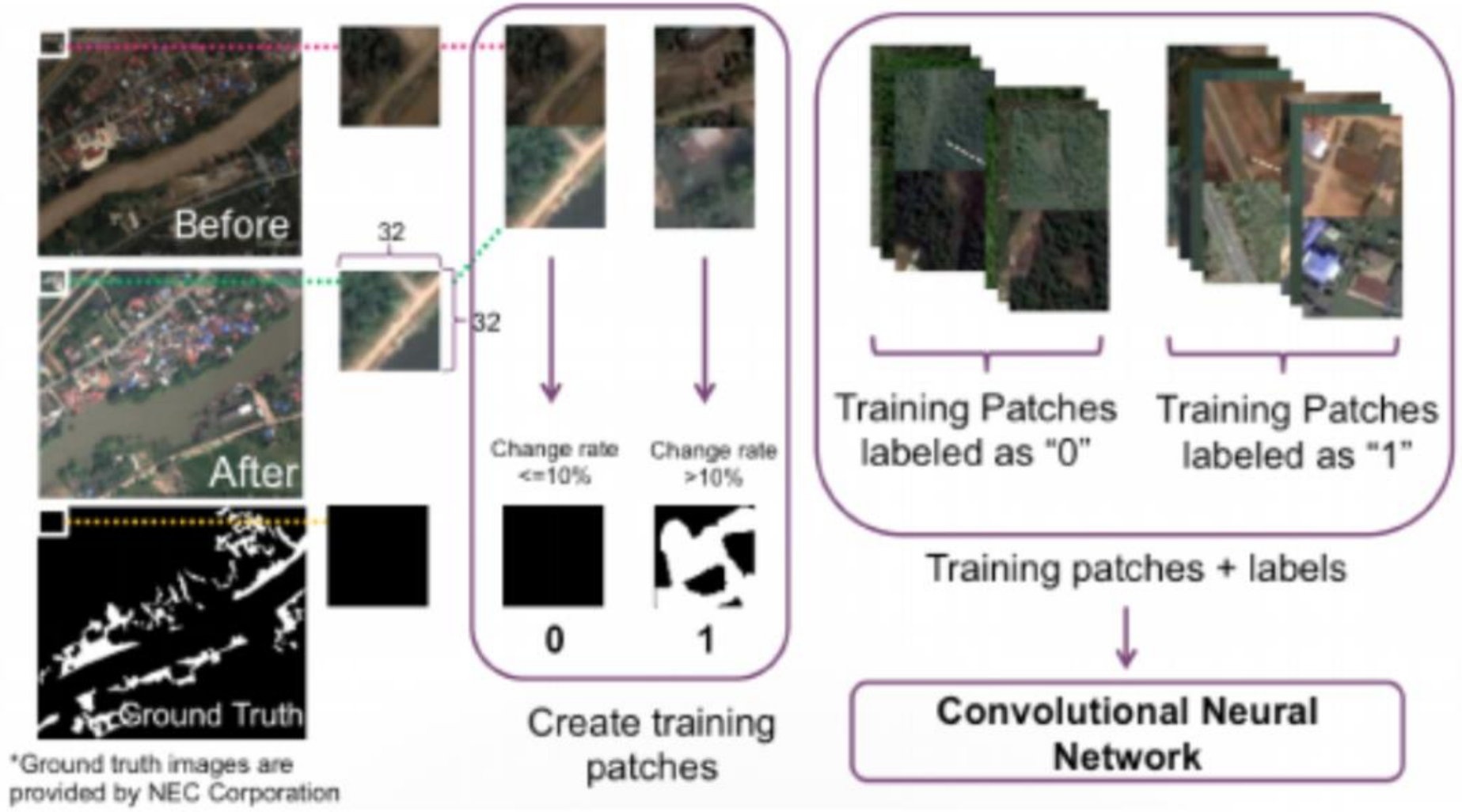


The base architecture of CNN used

Training set



Test set


Before
After
Ground Truth
32
32
Change rate
<=10%
Change rate
>10%
0
1
Create training
patches
Training Patches
labeled as "0"
Training Patches
labeled as "1"
Training patches + labels
Convolutional Neural
Network
*Ground truth images are
provided by NEC Corporation

Future Scope

Project can be used as a disaster management alert app which can be installed in mobile phones.

Project should Alert about other disasters like landslides,cyclone,etc.

Thank You