

FC to Convolutional Implementation

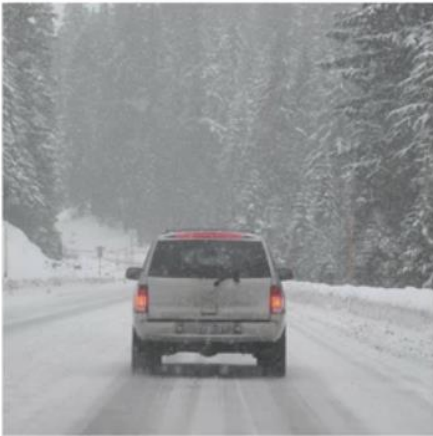
Vision Lab.

오명운

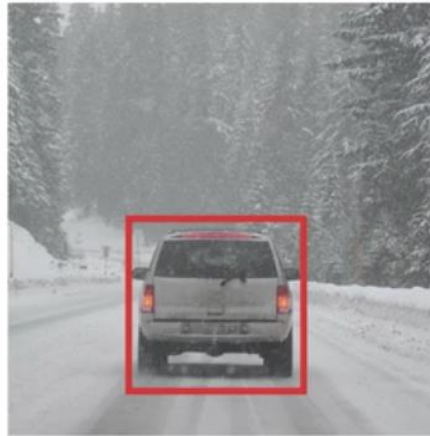
Classification, Localization and Detection

- 용어 정의

Image classification

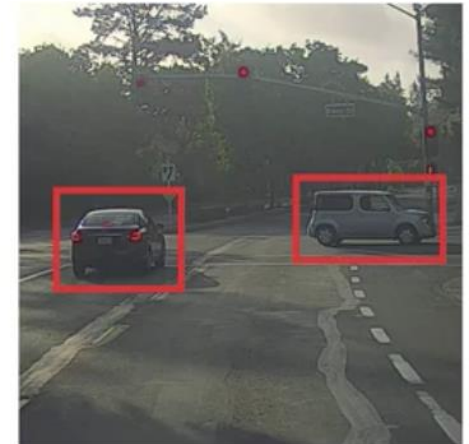


Classification with localization



1 Object

Detection

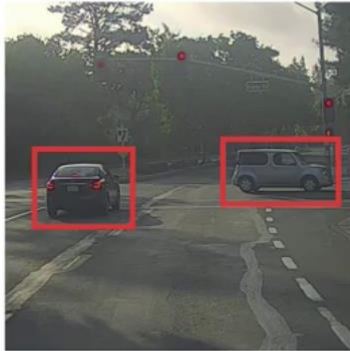


Multiple Objects
Different Categories

Classification with CNN

- 이미지를 labeling 한 다음에 학습을 먼저 시킨다.

이렇게 인식하기 위해서



Training set:

x

y



1



1



1



0

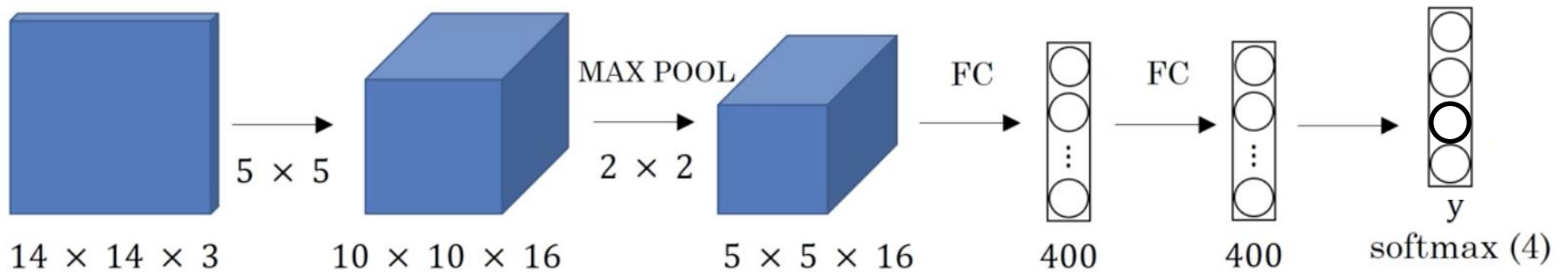
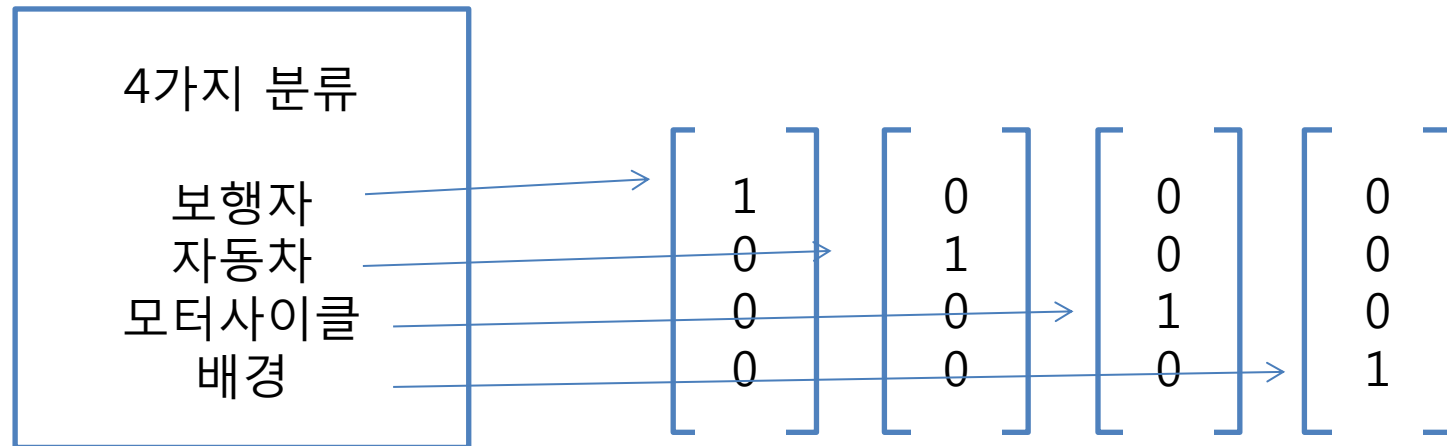


0

이미지당 14X14X3

Classification with CNN

- 일반적인 CNN



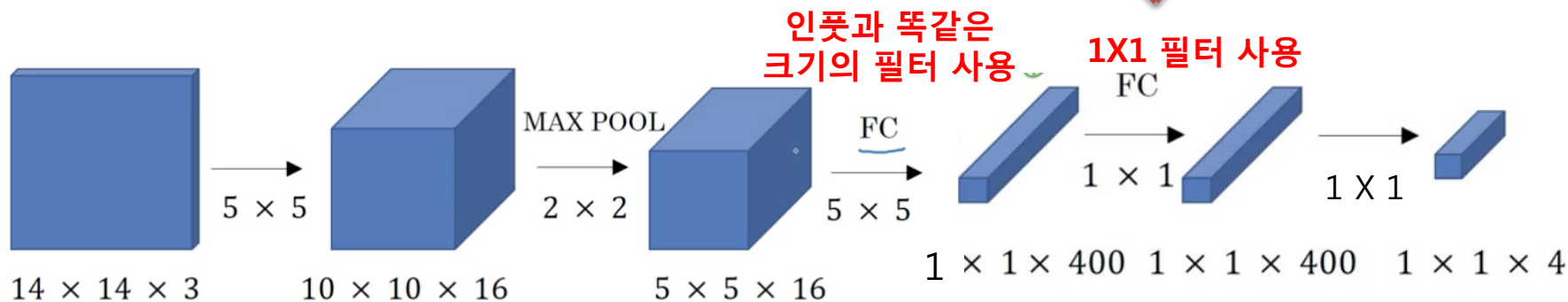
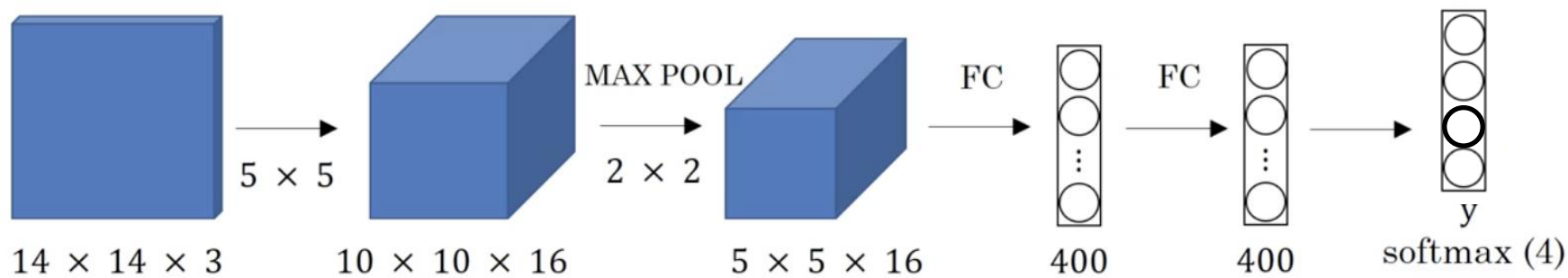
Sliding Windows Detection

- 학습 시킨 CNN에,
윈도우의 크기를 달리 하여, 크롭된 이미지를 넣는다.
 - 크롭된 이미지가 무지하게 많이 생기므로, 연산이 느려지는 단점이 있다. => 이것을 극복하는 방법?



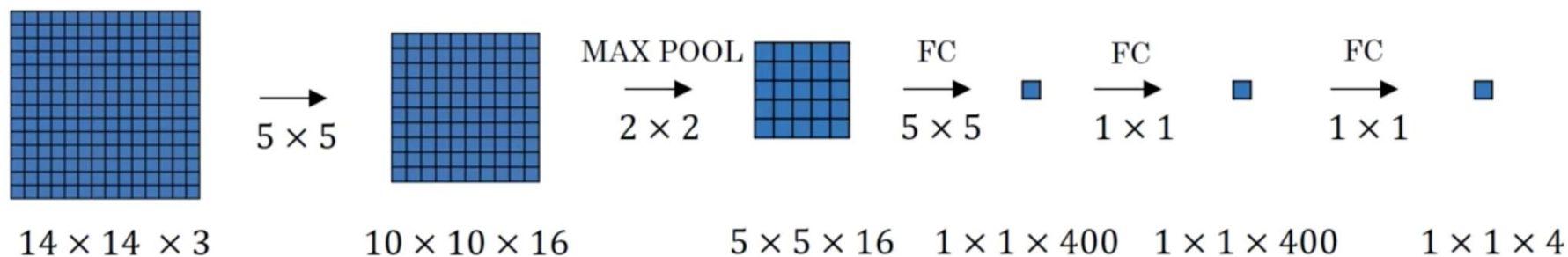
Conv Implementation on Sliding Window

- 기존의 FC 부분을, Conv으로 바꾸는 방법!
 - 슬라이딩 윈도우 방식의 속도를 빠르게 하는 key 다!

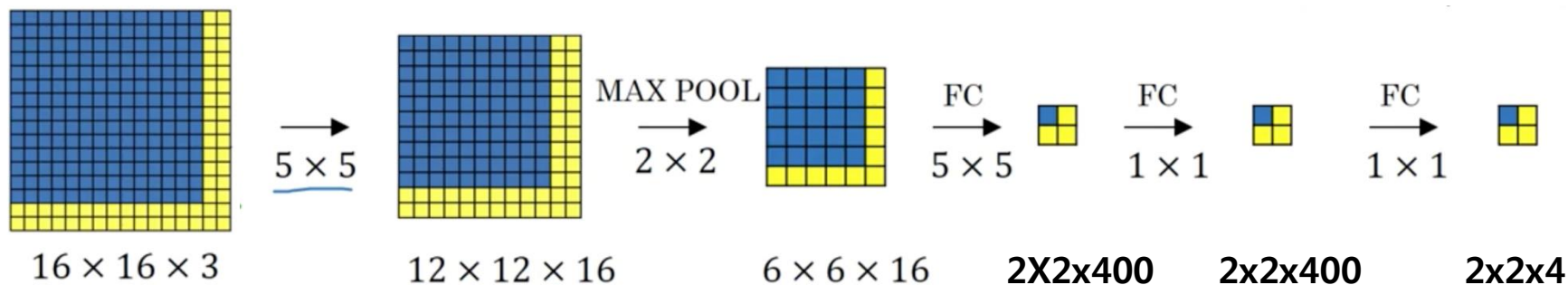


Conv Implementation on Sliding Window

- 여러 윈도우에 대한 결과를 한번에 얻을 수 있다.
- OverFeat: Integrated Recognition, Localization and Detection using Convolutional Networks. CVPR 2014
 - Pierre Sermanet, David Eigen, Xiang Zhang, Michael Mathieu, Rob Fergus, Yann LeCun

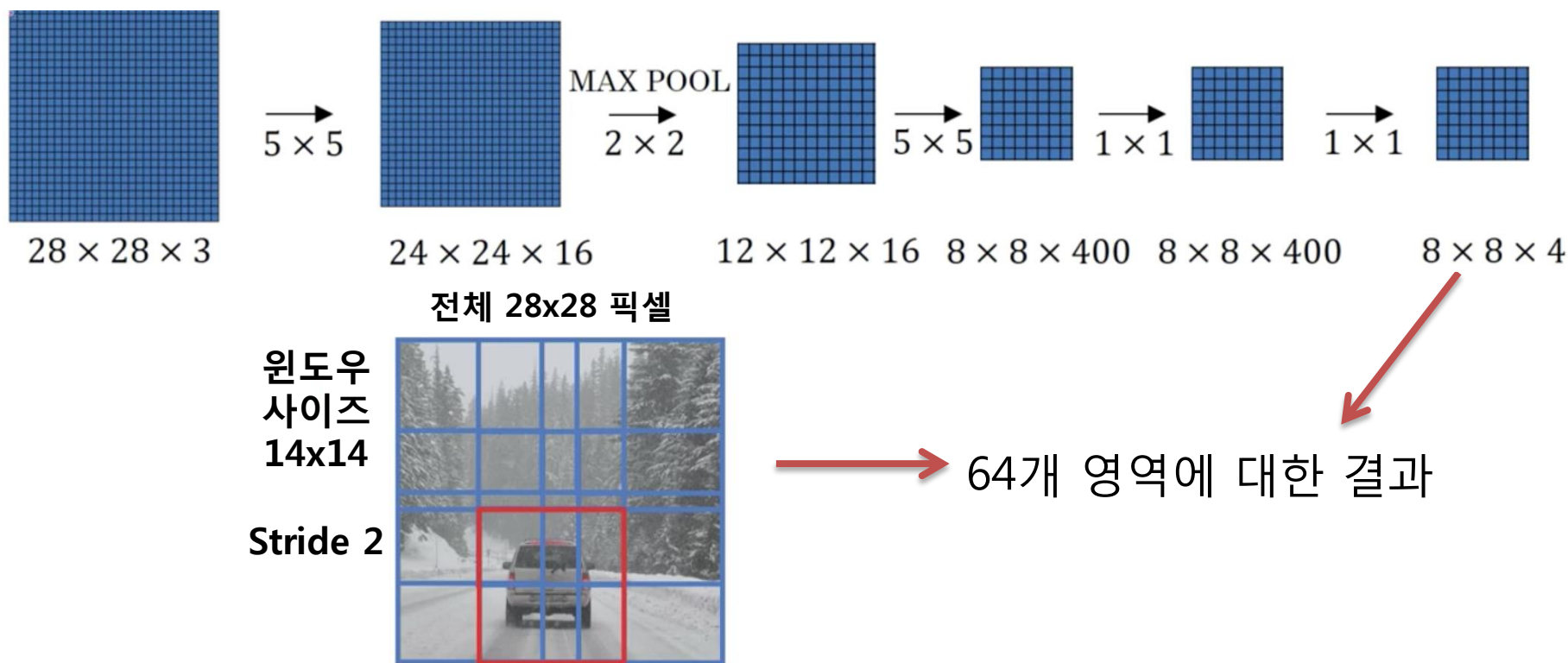


전체 16x16, 윈도우 14x14, stride 2



Conv Implementation on Sliding Window

- 전체 28x28 이미지 => 윈도우사이즈 14x14 => stride 2로 놓으면, 8x8 개의 영역으로 나눌 수 있다.
- 따라서, 64개 윈도우에 대한 결과를 한번에 얻을 수 있다.

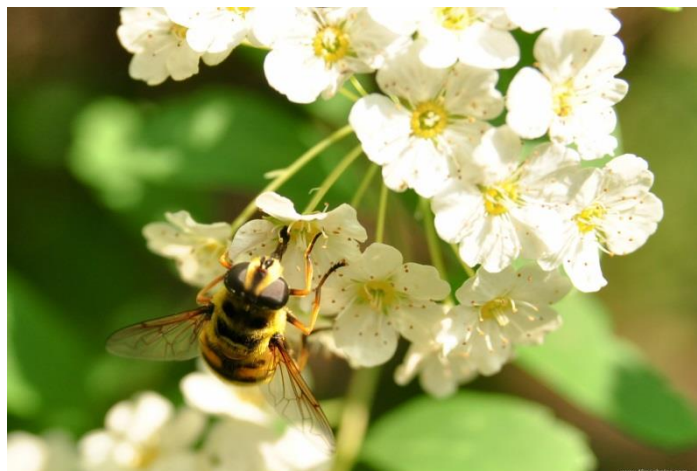


Github : sermanet/OverFeat

- OverFeat: Integrated Recognition, Localization and Detection using Convolutional Networks. CVPR 2014
 - Pierre Sermanet, David Eigen, Xiang Zhang, Michael Mathieu, Rob Fergus, Yann LeCun
- 위 논문에 대한 구현이 있는 깃허브
 - <https://github.com/sermanet/OverFeat>
 - OverFeat was trained on the ImageNet dataset
- Installation and Test
 - 아카이브 다운로드
 - 웨이트 파일 다운로드
 - 인스톨 명령 실행

OverFeat Test

- Pre-Compiled Binary 로 실행해 봄



```
overfeat — -bash — 91x60
[macroui-iMac:overfeat macro$ ./bin/macos/overfeat -n 6 samples/bee.jpg
bee 0.861348
leaf beetle, chrysomelid 0.0543207
fly 0.0309718
long-horned beetle, longicorn, longicorn beetle 0.0209769
ladybug, ladybeetle, lady beetle, ladybird, ladybird beetle 0.0187975
ant, emmet, pismire 0.00559438
macroui-iMac:overfeat macro$
```

OverFeat Test



```
macroui-iMac:overfeat macro$ ./bin/macos/overfeat -n 6 samples/pliers.jpg  
syringe 0.499662  
black widow, Latrodectus mactans 0.0383816  
fiddler crab 0.0345791  
screwdriver 0.0332903  
nail 0.0323011  
paintbrush 0.0273381  
macroui-iMac:overfeat macro$
```



OverFeat Test

```
[macroui-iMac:overfeat macro$ ./bin/macos/overfeat -n 6 samples/stairs.jpg  
vault 0.387758  
organ, pipe organ 0.0972616  
church, church building 0.0843286  
prison, prison house 0.0547077  
monastery 0.0537671  
slot, one-armed bandit 0.0399663  
macroui-iMac:overfeat macro$
```