Pooling Layer

降低卷积层对位置的敏感性，同时降低对空间降采样表示的敏感性。

Max Pooling & Average Pooling

池运算是确定性的，通常计算汇聚窗口中所有元素的最大值或平均值。

在这两种情况下，与互相关运算符一样，汇聚窗口从输入张量的左上角开始，从左往右、从上往下的在输入张量内滑动。

在汇聚窗口到达的每个位置，计算该窗口中输入子张量的最大值或平均值。

Traditional Pooling Code

```python
import torch
from torch import nn
from d2l import torch as d2l

def pool2d(X, pool_size, mode='max'):
    p_h, p_w = pool_size
    Y = torch.zeros((X.shape[0] - p_h + 1, X.shape[1] - p_w + 1))
    for i in range(Y.shape[0]): # Loop over rows
        for j in range(Y.shape[1]): # Loop over columns
            if mode == 'max':
                Y[i,j] = X[i:i + p_h, j:j + p_w].max()
            elif mode == 'avg':
                Y[i,j] = X[i:i + p_h, j:j + p_w].mean()
    return Y

X = torch.tensor([[0.0,1.0,2.0],[3.0,4.0,5.0],[6.0,7.0,8.0]])
print(pool2d(X, (2,2))) # max
print(pool2d(X, (2,2)，'avg')) # avg
```

Pytorch Pooling Code

```python
import torch
from torch import nn
from d2l import torch as d2l
X = torch.arange(16,dtype=torch.float32).reshape((1,1,4,4))
print(X)
pool2d = nn.MaxPool2d(3)
# Pytorch的池化层padding默认等于size，stride默认为0
pool2d(X)

pool2d = nn.MaxPool2d(3,padding=1,stride=2)
print(pool2d(X))

pool2d = nn.MaxPool2d((2,3),padding=(1,1),stride=(2,3))
print(pool2d(X))

X = torch.cat((X,X+1),1)
print(X.shape)
print(X)
```

```python
pool2d = nn.MaxPool2d(3,padding=1,stride=2)
print(pool2d(X))
```