Sparse Convolution

Simple Usage

See `main.cpp`.

Files and Directories

```
├── acc_function
│   ├── AcceleratorFunction.h
│   └── winograd
│       ├── WinogradFunction_1D.h
│       └── WinogradFunction.h
├── CMakeLists.txt
├── feature_map
│   ├── DirectFeatureMap.h
│   ├── FeatureMap.h
│   ├── Im2colFeatureMap.h
│   └── RegularSparseFeatureMap.h  // Regular sparse feature map (***HERE!***)
├── kernel
│   ├── DirectKernel.cpp
│   ├── DirectKernel.h
│   ├── Im2colKernel.cpp
│   ├── Im2colKernel.h
│   └── Kernel.h
├── main.cpp
├── output_map
│   └── OutputMap.h
├── resources
│   └── pointcloud.npy
└── util
    └── GetTime.h
```

Result and Analysis

- Output Channel: 64

```
Direct conv: 2.68757
Im2col conv: 4.23059
Im2col conv with Winograd: 2.95461
Sparse conv: 0.474779
```

- Output Channel: 128

```
Direct conv: 4.53269
Im2col conv: 3.04854
Im2col conv with Winograd: 2.61382
Sparse conv: 0.686159
```

- Output Channel: 256

```
Direct conv: 9.55057
Im2col conv: 10.0181
Im2col conv with Winograd: 6.06519
Sparse conv: 1.23485
```

- Output Channel: 512

```
Direct conv: 24.9553
Im2col conv: 11.3911
Im2col conv with Winograd: 10.0813
Sparse conv: 2.63
```

Inference time is linearly corresponding to the amount of output channel because for every output channel the convolution operation repeats one more time.