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Theoretical Exercise 8

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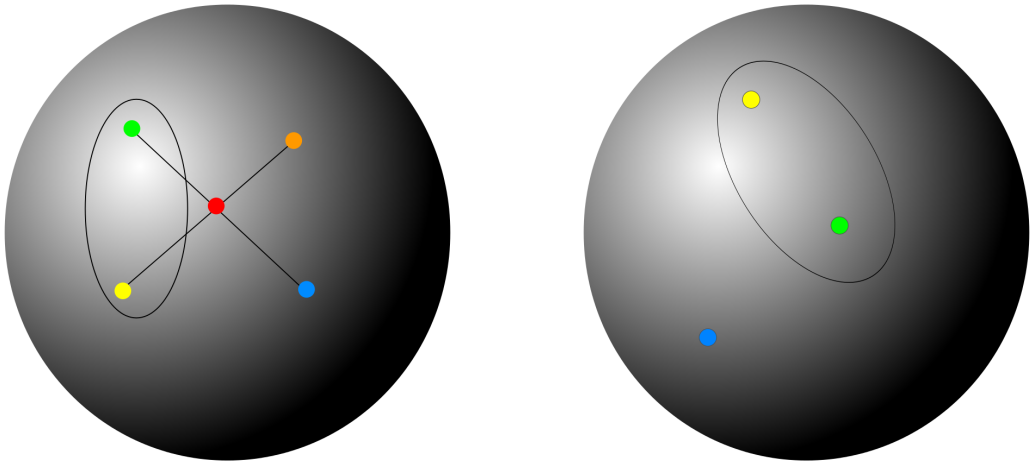
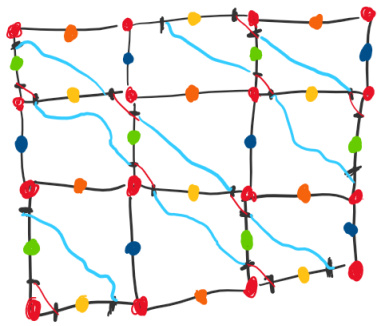
This is the sample solution.

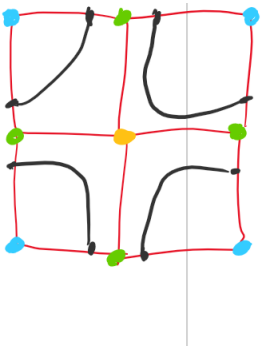
Exercise 1 Geometry images



Draw the parameterization to a square for the geometry image and toric cover respectively. In both cases sketch the path shown in the figure.

Solution





Exercise 2 Memory consumption

Assume you are given the following 3D Convolutional network (the input is a binary voxel grid):
Conv3d(3,32,1) (kernelsize = 3x3x3, 32 output channel, padding=1)
Conv3d(3,32,1)
MaxPool3D(2) (stride = 2x2x2)
Conv3d(3,64,1)
Conv3d(3,64,1)
MaxPool3D(2)
Conv3d(3,128,1)
Conv3d(3,128,1)
MaxPool3D(2)
Conv3d(3,256,1)
Conv3d(3,256,1)
MaxPool3D(2)
FC(1024) (1024 output channel)
FC(40)

How much memory do you need to train on a voxel grid with resolution 32 and batch size 8 (assume floating point precision with 32bits)?

Solution

model parameters:
3*3*3*(1*32+32*32+64*32+64*64+64*128+128*128+128*256+256*256) + 2*2*2*256*1024 + 1024*40 = 5650272 parameters = 180808704bit

intermediate values (how does maxpooling work here?): 32*32*32*(1+32+32) + 16*16*16*(32+64+64) + 8*8*8*(64+128+128) + 4*4*4*(128+256+256) + 2*2*2*(256) + 1024 + 40 = 2993192 vals = 95782144bit *8 for batchsize: 766257152

sum = 947065856bit = 118383232byte = 118Megabyte????