Creating_ising_gap_class

June 14, 2018

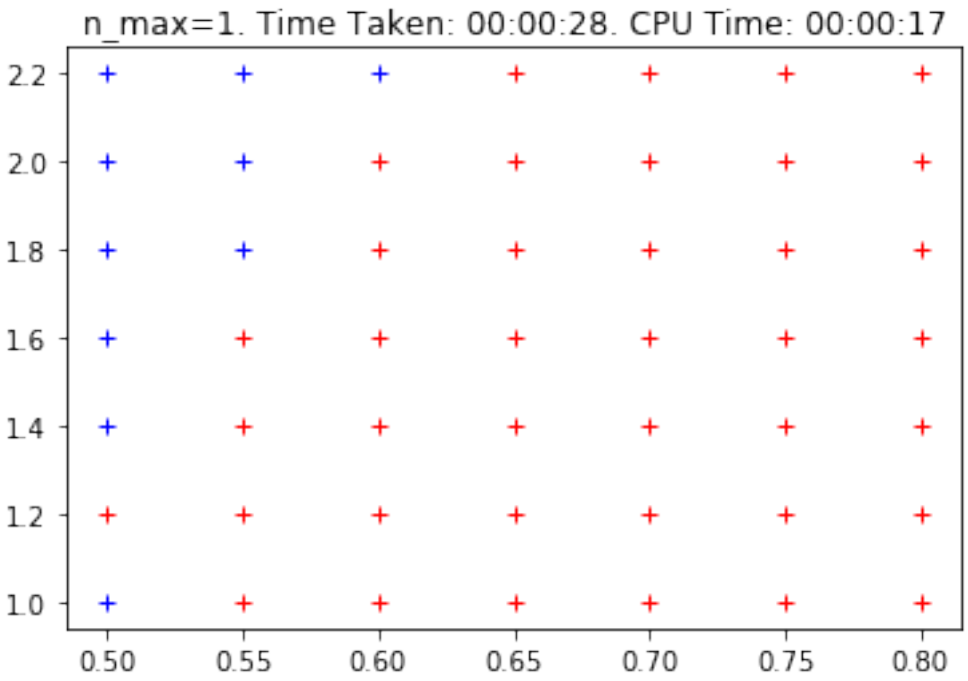
In [1]:
```
import bootstrap
import matplotlib.pyplot as plt
import time
import datetime
import numpy as np
```

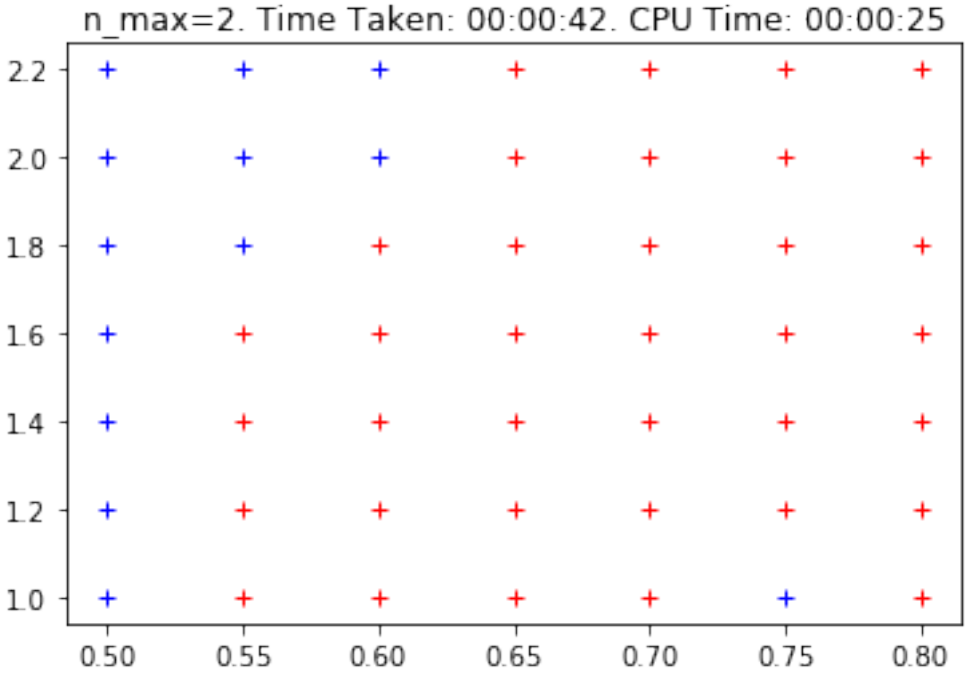
In [11]:
```
#We define a class which imposes a gap in the Z_2-even operator sector.
#The continuum starts at a specified value, and we add an operator between the unitarit
class IsingGap(object):
    bootstrap.cutoff=1e-10
    def __init__(self, gap, sig_values, eps_values):
        #Initialize default input parameters and the gap in the Z2-even operator spectr
        self.inputs={'dim': 3, 'kmax': 7, 'lmax': 7, 'nmax': 4, 'mmax': 2}
        self.gap=gap
        self.sig_values=sig_values
        self.eps_values=eps_values

    def plot_grid(self, parameter, table):
        start_time=time.time()
        start_cpu=time.clock()
        allowed_sig=[]
        allowed_eps=[]
        disallowed_sig=[]
        disallowed_eps=[]
        for sig in self.sig_values:
            for eps in self.eps_values:
                sdp=bootstrap.SDP(sig,table)
                sdp.set_bound(0,float(self.gap))
                sdp.add_point(0,eps)
                result=sdp.iterate()
                if result:
                    allowed_sig.append(sig)
                    allowed_eps.append(eps)
                else:
                    disallowed_sig.append(sig)
                    disallowed_eps.append(eps)
        end_time=time.time()
```

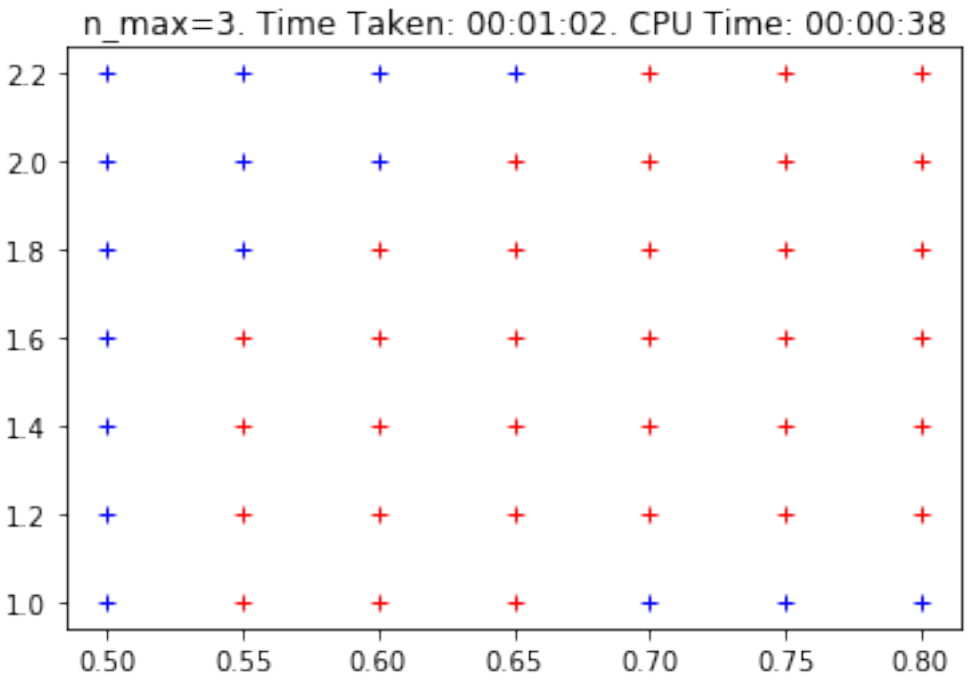
```
            end_cpu=time.clock()
            run_time=time.strftime("%H:%M:%S",time.gmtime(end_time-start_time))
            cpu_time=time.strftime("%H:%M:%S",time.gmtime(end_cpu-start_cpu))
            plt.plot(allowed_sig,allowed_eps,'r+')
            plt.plot(disallowed_sig,disallowed_eps,'b+')
            plt.title("n_max="+str(parameter)+". Time Taken: "+run_time+". CPU Time: "+cpu_
            plt.show()

        def iterate_parameter(self, par, par_range):
            if type(par_range)==int:
                par_range=[par_range]
            start_time=time.time()
            start_cpu=time.clock()
#           sig_set=np.arange(0.5,0.85,0.05)
#           eps_set=np.arange(1.0,2.2,0.2)
#           bootstrap.cutoff=1e-10
            for x in par_range:
                self.inputs[par]=x
                tab1=bootstrap.ConformalBlockTable(self.inputs['dim'],self.inputs['kmax'],s
                tab2=bootstrap.ConvolvedBlockTable(tab1)
                self.plot_grid(x,tab2)
            end_time=time.time()
            end_cpu=time.clock()
            run_time=time.strftime("%H:%M:%S",time.gmtime(end_time-start_time))
            cpu_time=time.strftime("%H:%M:%S",time.gmtime(end_cpu-start_cpu))
            print("Run time "+run_time, "CPU time "+cpu_time)
```

In [12]:
```
#Instantiate an IsingGap object and use iterate_paramter to plot grids.
sig_set=np.arange(0.5,0.85,0.05)
eps_set=np.arange(1.0,2.2,0.2)
ising_gap=IsingGap(3.0, sig_set, eps_set)
n_range=np.arange(1,4,1)
ising_gap.iterate_parameter('nmax',n_range)
```

```
/Users/MatthewDowens/Dropbox/PhD/bootstrap/pycftboot/bootstrap.py:952: RuntimeWarning: invalid v
  product *= x - (p - shift)
/Users/MatthewDowens/Dropbox/PhD/bootstrap/pycftboot/bootstrap.py:953: RuntimeWarning: invalid v
  return (base ** (x + shift)) / product
```


n_max=1. Time Taken: 00:00:28. CPU Time: 00:00:17
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.50
0.55
0.60
0.65
0.70
0.75
0.80


n_max=2. Time Taken: 00:00:42. CPU Time: 00:00:25
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.50
0.55
0.60
0.65
0.70
0.75
0.80




```
Run time 00:02:16 CPU time 00:01:24
```