projectXOR

Build rust module to python package

In [7]:
```
%%bash
# Make sure rustc is already installed
pip install maturin
cd algo
maturin develop
pip install target/wheels/*.whl --force-reinstall
```

```
Requirement already satisfied: maturin in /home/satheeshkumar/.conda/envs/gro
ot/lib/python3.11/site-packages (1.4.0)
🔗 Found pyo3 bindings
🐍 Found CPython 3.11 at /home/satheeshkumar/.conda/envs/groot/bin/python
📡 Using build options features from pyproject.toml
   Compiling algo v0.1.0 (/home/satheeshkumar/Groot/projectXOR/algo)
    Finished dev [unoptimized + debuginfo] target(s) in 0.37s
📦 Built wheel for CPython 3.11 to /tmp/.tmpYaOsiC/algo-0.1.0-cp311-cp311-lin
ux_x86_64.whl
🛠 Installed algo-0.1.0
Processing ./target/wheels/algo-0.1.0-cp311-cp311-manylinux_2_34_x86_64.whl
Installing collected packages: algo
  Attempting uninstall: algo
    Found existing installation: algo 0.1.0
    Uninstalling algo-0.1.0:
      Successfully uninstalled algo-0.1.0
Successfully installed algo-0.1.0
```

Restart the kernal after installing it

In [1]:
```
import algo
import numpy as np
import pandas as pd
import seaborn as sb
import matplotlib.pyplot as plt
```

In [2]:
```
dir(algo)
# It has four function (64bit precision)
# angle_to_repr,
# repr_to_angle,
# shift_range,
# xor,
# generate
```

Out[2]:
```
['__all__',
 '__builtins__',
 '__cached__',
 '__doc__',
 '__file__',
 '__loader__',
 '__name__',
 '__package__',
 '__path__',
 '__spec__',
 'algo',
 'angle_to_repr',
 'generate',
 'repr_to_angle',
 'shift_range',
 'xor']
```

In [3]:
```
# angle_to_repr (float) = range : 0(2^0 - 1) - 18446744073709551615(2^64 - 1
print(algo.angle_to_repr(0.0))
print(algo.angle_to_repr(360.0))
print(algo.angle_to_repr(220.2364))
print(algo.angle_to_repr(0.00000000000000543))
```

```
0
18446744073709551615
11285123629208684544
278
```

In [4]:
```
# repr_to_angle (integer)
print(algo.repr_to_angle(0))
print(algo.repr_to_angle(18446744073709551615))
print(algo.repr_to_angle(11285123629208684544))
print(algo.repr_to_angle(278))
```

```
0.0
360.0
220.2364
5.425347671117464e-15
```

In [5]:
```
# xor(angle1, angle2)
algo.xor(220.34, 154.23)
```

Out[5]:
```
338.92330265432287
```

In [6]:
```
# shift_range : it will done (angle & (end-start)) + start
algo.shift_range(338.92, 0.0, 50.0)
```

Out[6]:
```
46.41725271541141
```

generate matrix

In [7]:
```
def angle(n):
    return np.random.random(n) * 360
```

In [32]:
```
# Generate Square Matrix of size n
n = 10
a = angle(1)
row = np.append(a, angle(n-1))
column = np.append(a, angle(n-1))
print(row)
print(column)
data = algo.generate(row,column)
pd.DataFrame(data)
```

```
[ 31.87620021   1.85998053 252.96073807  99.10816915 236.32374714
 256.91099613 230.7296459  331.2239685  239.45103666 126.78072241]
[ 31.87620021 220.0056563   27.75406003 256.60549019 162.89532332
 175.35300009 221.55993107 340.18243522  32.33815093 300.57395341]
```

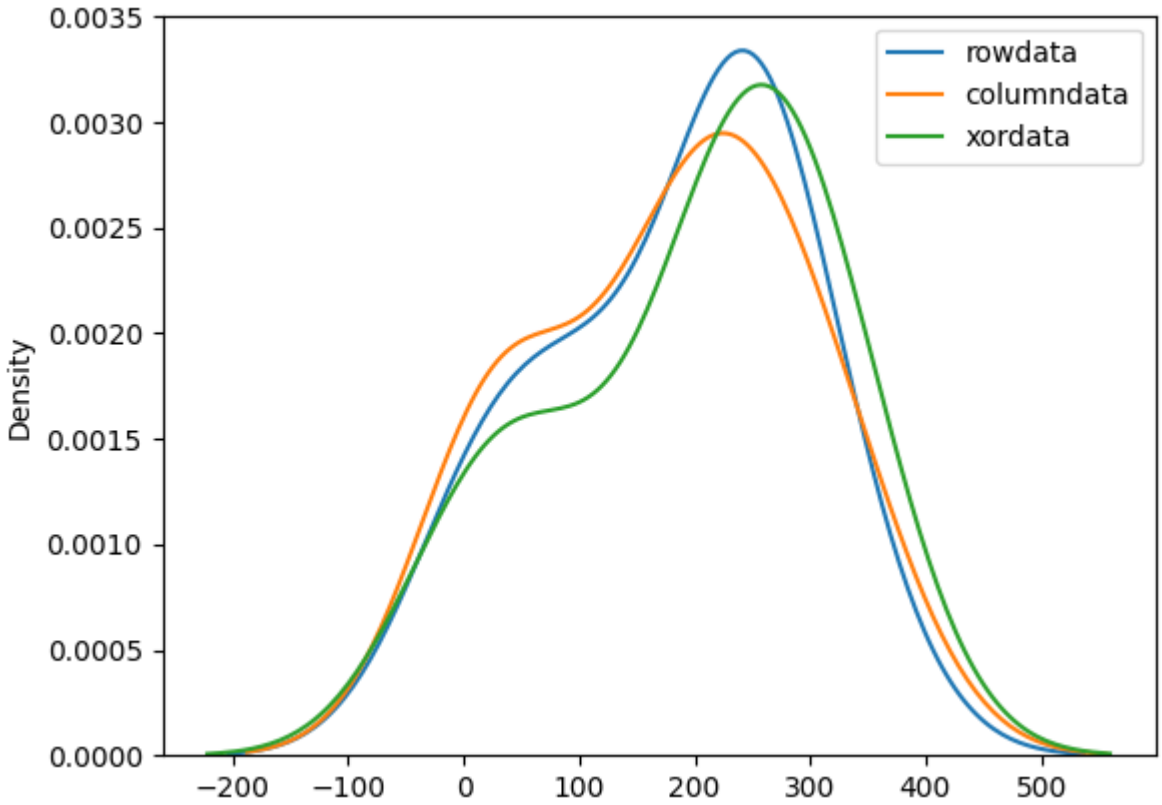
Out[32]:

	0	1	2	3	4	5	6
0	31.876200	1.859981	252.960738	99.108169	236.323747	256.910996	230.729646
1	220.005656	220.958916	65.754869	147.262640	270.995393	165.959743	295.438848
2	27.754060	200.545445	225.518421	282.514637	11.706211	177.665413	242.226565
3	256.605490	80.011834	214.781805	113.015967	123.831737	53.931227	194.204667
4	162.895323	105.751776	297.467546	185.392863	309.173740	356.499433	168.197180
5	175.353000	78.055457	320.679235	146.054352	264.414798	92.139662	76.107096
6	221.559931	239.130108	109.718083	58.853489	210.755149	298.626565	318.194648
7	340.182435	129.221799	30.770238	84.685330	238.923534	176.824889	224.958383
8	32.338151	108.429037	125.131066	141.696601	288.488092	248.336905	66.622271
9	300.573953	214.668536	270.507357	231.499973	148.683111	305.346916	346.302866

xor of two vectors

In [33]:
```
xordata = list(map(lambda x : algo.xor(x[0],x[1]), zip(row,column)))
sb.kdeplot(row, label="rowdata")
sb.kdeplot(column, label="columndata")
sb.kdeplot(xordata, label="xordata")
plt.legend()
```

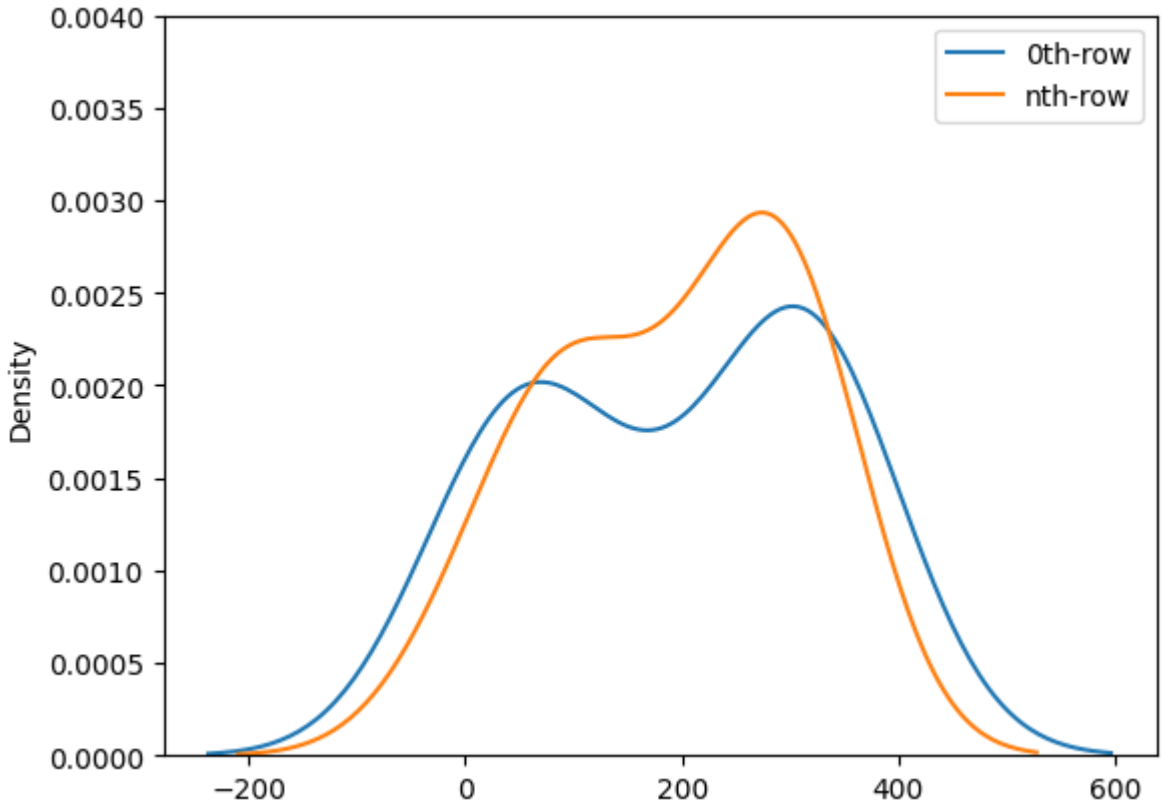
Out[33]:
```
<matplotlib.legend.Legend at 0x7fa6f52f7810>
```



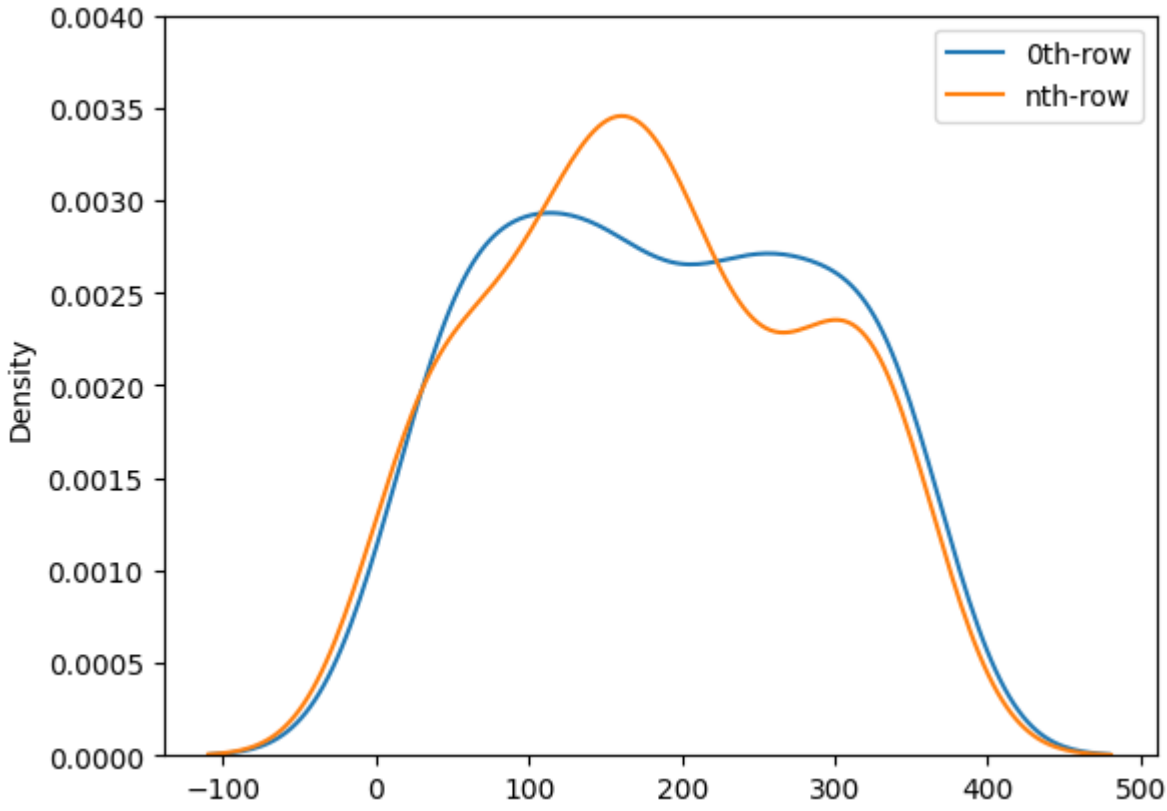
KdePlot

In [18]:
```
def plot(n):
    a = angle(1)
    row = np.append(a, angle(n-1))
    column = np.append(a, angle(n-1))
    data = np.array(algo.generate(row,column))
    sb.kdeplot(data[0],label="0th-row")
    sb.kdeplot(data[n-1],label="nth-row")
    plt.ylim(0,0.004)
    plt.legend()
    del(a)
    del(row)
    del(column)
    del(data)
```

In [11]:
```
# n = 10
plot(10)
```

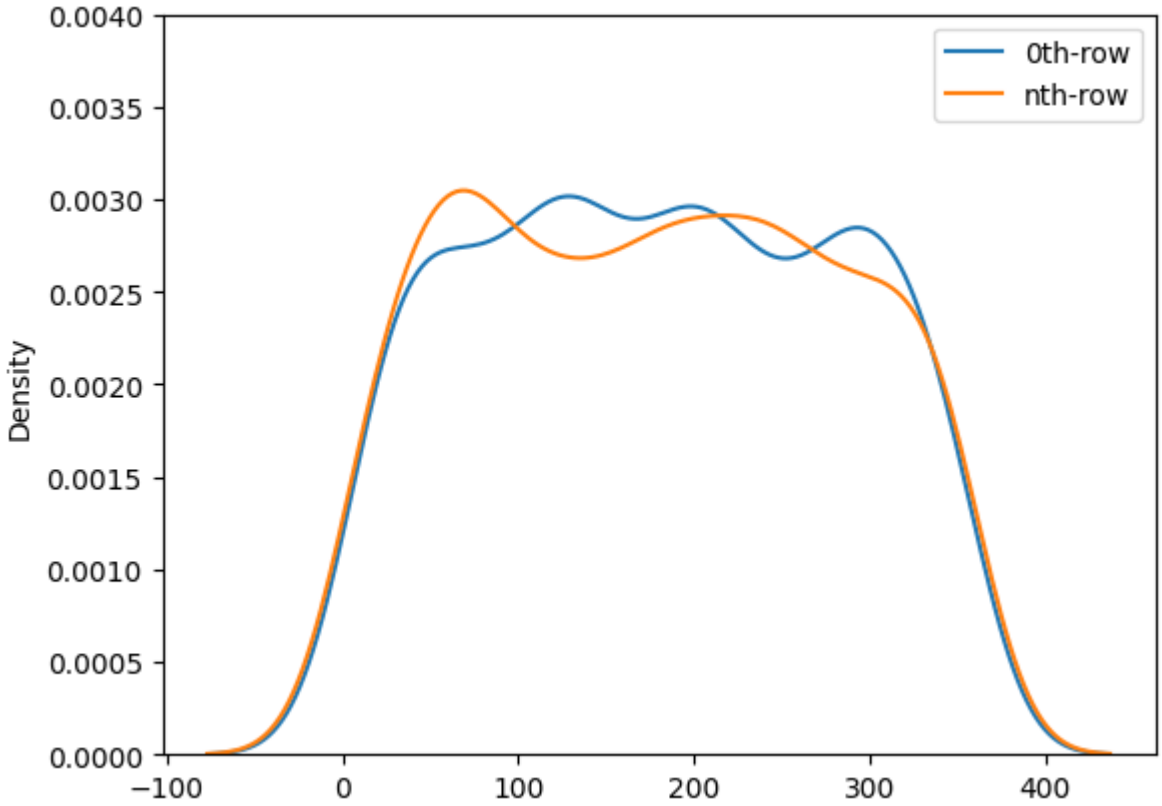


In [12]:
```
# n = 100
plot(100)
```

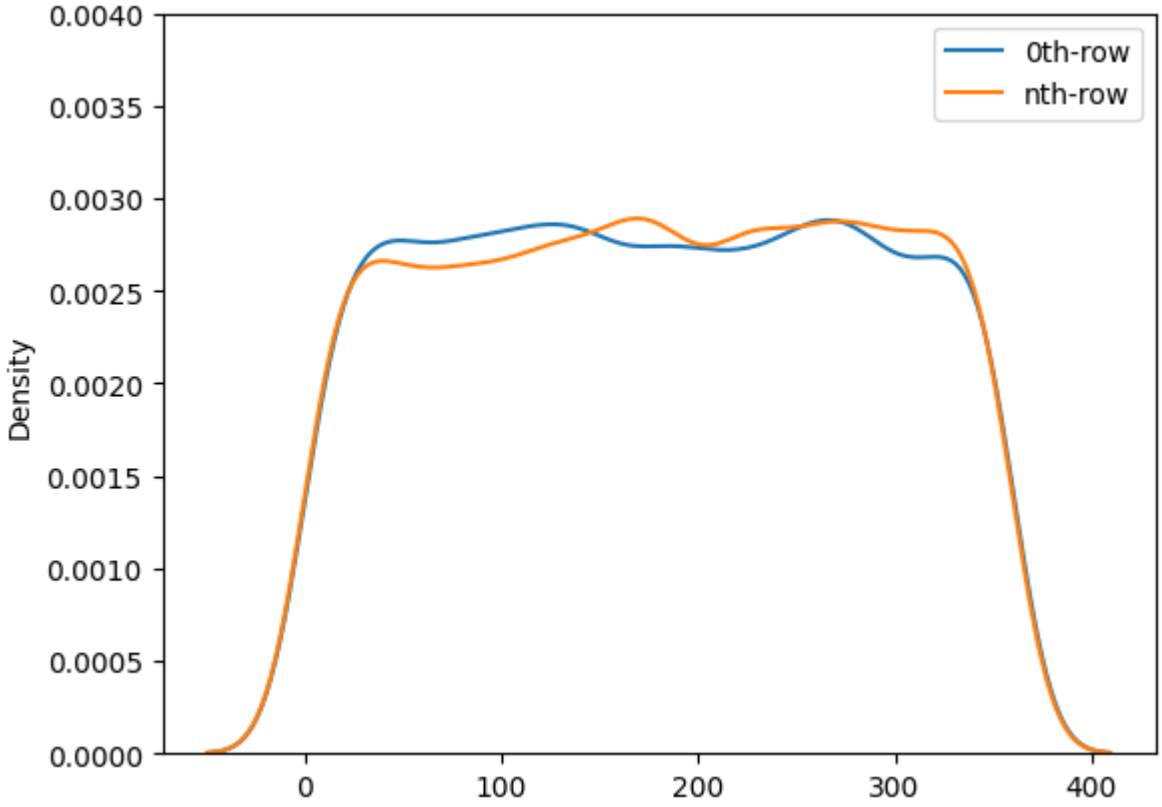


In [13]:
```
# n = 1000
```

```
plot(1000)
```



In [14]:
```
# n = 10000
plot(10000)
```



In [9]:
```
!jupyter nbconvert --to webpdf main.ipynb main.pdf
from IPython.display import clear_output
clear_output()
```

In [ ]:
```

```