

Ising_1D

November 5, 2023

1 1D Ising Model Simulation

```
[ ]: import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import seaborn as sns
sns.set()
```

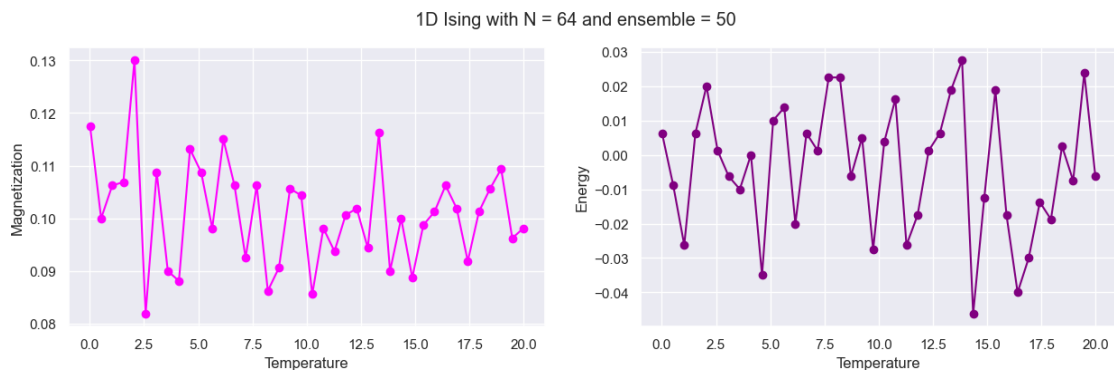
1.1 First Nearest Neighbor

```
[ ]: data_64 = pd.read_csv("first_neighbor/Ising_1D_64.csv")
data_128 = pd.read_csv("first_neighbor/Ising_1D_128.csv")
data_256 = pd.read_csv("first_neighbor/Ising_1D_256.csv")
```

```
[ ]: fig, ax = plt.subplots(1,2, figsize=(15,4))
ax[0].plot(data_64["Temperature"], data_64["Magnetization"], "-o", color="magenta")
ax[0].set_xlabel("Temperature")
ax[0].set_ylabel("Magnetization")

ax[1].plot(data_64["Temperature"], data_64["Energy"], "-o", color="Purple")
ax[1].set_xlabel("Temperature")
ax[1].set_ylabel("Energy")

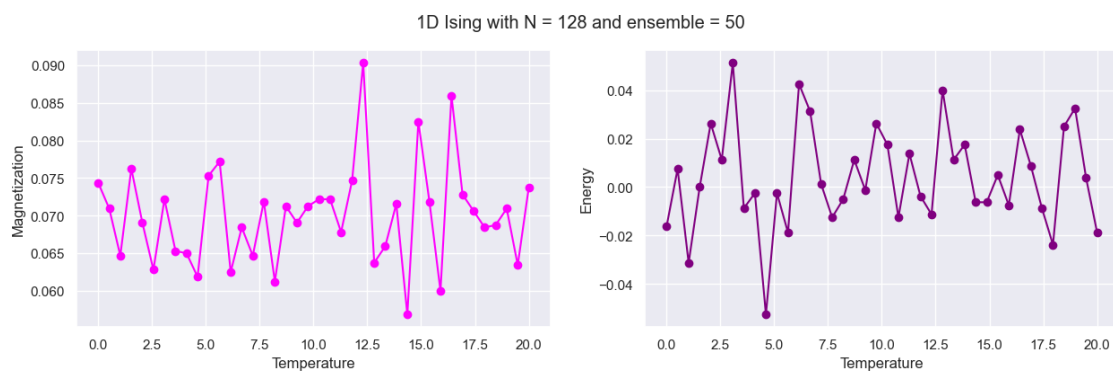
plt.suptitle("1D Ising with N = 64 and ensemble = 50")
plt.show()
```



```
[ ]: fig, ax = plt.subplots(1,2, figsize=(15,4))
ax[0].plot(data_128["Temperature"], data_128["Magnetization"], "-o",
           color="magenta")
ax[0].set_xlabel("Temperature")
ax[0].set_ylabel("Magnetization")

ax[1].plot(data_128["Temperature"], data_128["Energy"], "-o", color="Purple")
ax[1].set_xlabel("Temperature")
ax[1].set_ylabel("Energy")

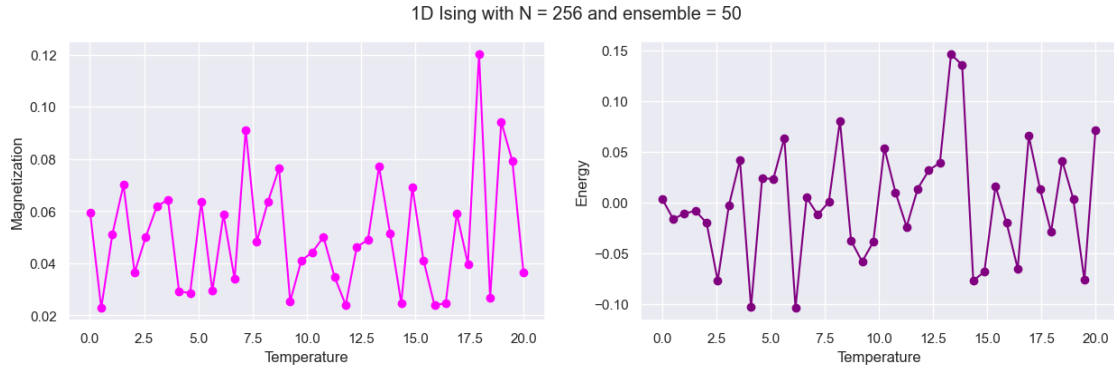
plt.suptitle("1D Ising with N = 128 and ensemble = 50")
plt.show()
```



```
[ ]: fig, ax = plt.subplots(1,2, figsize=(15,4))
ax[0].plot(data_256["Temperature"], data_256["Magnetization"], "-o",
           color="magenta")
ax[0].set_xlabel("Temperature")
ax[0].set_ylabel("Magnetization")

ax[1].plot(data_256["Temperature"], data_256["Energy"], "-o", color="Purple")
ax[1].set_xlabel("Temperature")
ax[1].set_ylabel("Energy")

plt.suptitle("1D Ising with N = 256 and ensemble = 50")
plt.show()
```



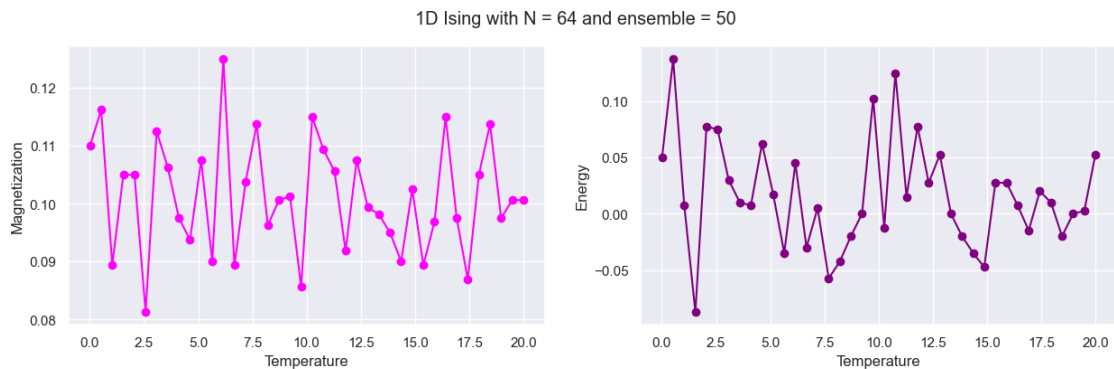
1.2 Second Nearest Neighbor

```
[ ]: data_64 = pd.read_csv("second_neighbor/Ising_1D_64.csv")
data_128 = pd.read_csv("second_neighbor/Ising_1D_128.csv")

[ ]: fig, ax = plt.subplots(1,2, figsize=(15,4))
ax[0].plot(data_64["Temperature"], data_64["Magnetization"], "-o", color="magenta")
ax[0].set_xlabel("Temperature")
ax[0].set_ylabel("Magnetization")

ax[1].plot(data_64["Temperature"], data_64["Energy"], "-o", color="Purple")
ax[1].set_xlabel("Temperature")
ax[1].set_ylabel("Energy")

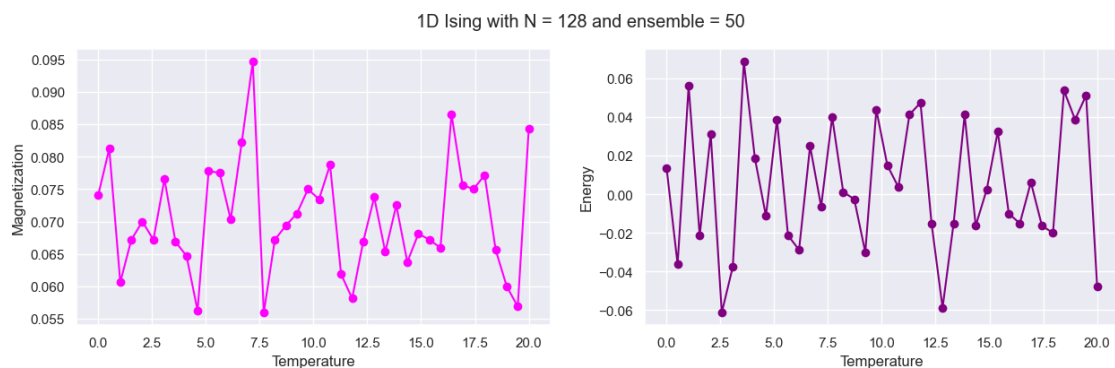
plt.suptitle("1D Ising with N = 64 and ensemble = 50")
plt.show()
```



```
[ ]: fig, ax = plt.subplots(1,2, figsize=(15,4))
ax[0].plot(data_128["Temperature"], data_128["Magnetization"], "-o", color="magenta")
ax[0].set_xlabel("Temperature")
ax[0].set_ylabel("Magnetization")

ax[1].plot(data_128["Temperature"], data_128["Energy"], "-o", color="Purple")
ax[1].set_xlabel("Temperature")
ax[1].set_ylabel("Energy")

plt.suptitle("1D Ising with N = 128 and ensemble = 50")
plt.show()
```



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[ ]:
```