Installing packages

```
pip install git+https://github.com/Techtonique/nnetsauce.git

pip install matplotlib==3.1.3
```

Obtaining predictions from nnetsauce's MTS

```
import nnetsauce as ns
import numpy as np
import matplotlib.pyplot as plt
from sklearn import datasets, metrics
from sklearn import linear_model


# a simple example with 3 made-up multivariate time series
np.random.seed(123)
M = np.random.rand(10, 3)
M[:,0] = 10*M[:,0]
M[:,2] = 25*M[:,2]
M[:,1] = M[:,2]/23 + 0.5

print("Initial series")
print(M)
print("\n")

# using a Bayesian model along with nnetsauce's MTS
regr = linear_model.BayesianRidge()
obj_MTS = ns.MTS(regr, lags = 2, n_hidden_features=5)
obj_MTS.fit(M)

print("mean forecast -----")
preds = obj_MTS.predict(h=10)
print(preds)
print("\n")

# confidence level = 80%
# makes the assumption of Gaussian uncertainty and works
# only if the shared supervised learning model has an argument
`return_std`
# in method `predict`
print("predict with credible intervals and confidence level = 80%
-----")
preds_80 = obj_MTS.predict(h=10, return_std=True, level=80)
print(preds_80)
print("\n")

# confidence level = 95%
# makes the assumption of Gaussian uncertainty and works
# only if the shared supervised learning model has an argument
```

```
`return_std`
# in method `predict`
print("predict with credible intervals and confidence level = 95%
-----")
preds_95 = obj_MTS.predict(h=10, return_std=True, level=95)
print(preds_95)
print("\n")
```

```
Initial series
[[ 6.96469186  0.74657767  5.67128634]
 [ 5.51314769  0.95989833 10.5776615 ]
 [ 9.80764198  1.02275207 12.02329754]
 [ 3.92117518  1.29244533 18.22624268]
 [ 4.38572245  0.9326568   9.95110638]
 [ 7.37995406  0.69070843  4.3862939 ]
 [ 5.31551374  1.18956626 15.86002396]
 [ 8.49431794  1.16415599 15.27558777]
 [ 7.22443383  0.89324854  9.04471639]
 [ 2.28263231  1.18584361 15.7744031 ]]


mean forecast -----
[[ 6.09958391  1.0445821  12.56586894]
 [ 6.09858969  1.04358789 12.56487472]
 [ 6.10102293  1.04602113 12.56730796]
 [ 6.10101234  1.04601054 12.56729738]
 [ 6.10097759  1.04597578 12.56726262]
 [ 6.10097809  1.04597629 12.56726312]
 [ 6.10097859  1.04597678 12.56726362]
 [ 6.10097857  1.04597677 12.5672636 ]
 [ 6.10097857  1.04597676 12.5672636 ]
 [ 6.10097857  1.04597676 12.5672636 ]]


predict with credible intervals and confidence level = 80% -----
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predict with credible intervals and confidence level = 95% -----
{'mean': array([[ 6.09958391,  1.0445821 , 12.56586894],
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       [14.501976  ,  9.44697419, 20.96826103],
       [14.50327104,  9.44826923, 20.96955607]])}
```
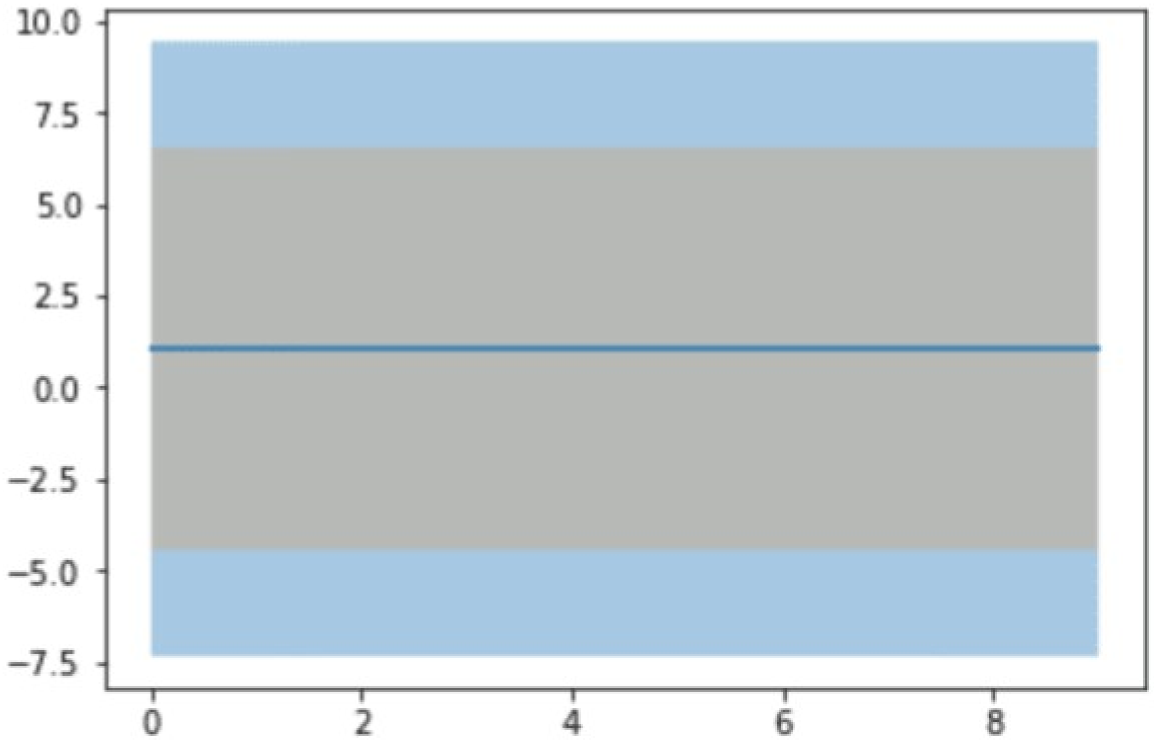

Visualizing credible (because Bayesian, “credible”) intervals

```
j0 = 1 # choice of time series index

x = np.linspace(0, 9, 10)
y_est = preds_95['mean'][:,j0]
y_est_upper = preds_95['upper'][:,j0]
y_est_lower = preds_95['lower'][:,j0]
y_est_upper2 = preds_80['upper'][:,j0]
y_est_lower2 = preds_80['lower'][:,j0]


fig, ax = plt.subplots()
ax.plot(x, y_est, '-')
ax.fill_between(x, y_est_lower, y_est_upper, alpha=0.4)
ax.fill_between(x, y_est_lower2, y_est_upper2, alpha=0.2)
```


10.0
7.5
5.0
2.5
0.0
−2.5
−5.0
−7.5
0
2
4
6
8