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import matplotlib.pyplot as plt

import numpy as np

import random

from sklearn.linear_model import Ridge

from sklearn.preprocessing import PolynomialFeatures

from sklearn.pipeline import make_pipeline

from sklearn.linear_model import LinearRegression

x = np.linspace(0.02, 0.98, 200)

noise = np.asarray(random.sample((range(200)),200))

y = x**3*noise

yn = x**3*100

poly3 = PolynomialFeatures(degree=3)

X = poly3.fit_transform(x[:,np.newaxis])

clf3 = LinearRegression()

clf3.fit(X,y)

Xplot = poly3.fit_transform(x[:,np.newaxis])
poly3_plot = plt.plot(x, clf3.predict(Xplot), label = 'Cubic Fit')

plt.plot(x, yn, color = 'red', label = "True Cubic")

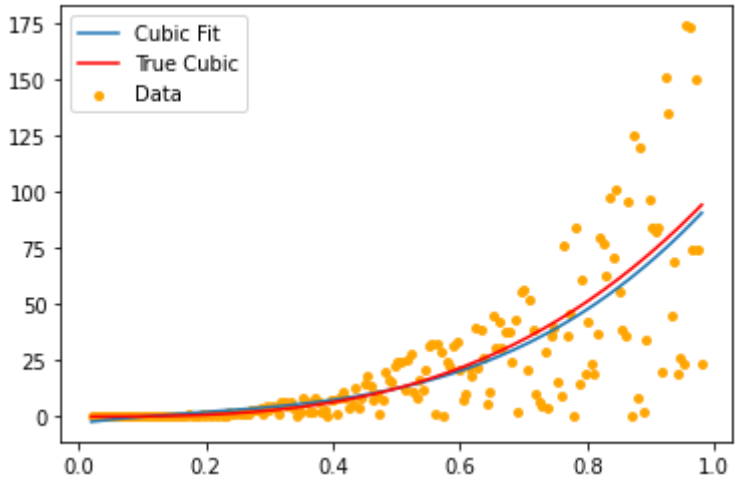
plt.scatter(x, y, label = 'Data', color = 'orange', s= 15)

plt.legend()

plt.show()

def error(a):
  for i in y:
    err = (y-yn)/yn
  return abs(np.sum(err))/len(err)

print(error(y))
```

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0.004999999999999996
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