SLR

January 31, 2018

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In [1]: import numpy as np
        import scipy.stats as stats
        class SLR():
            def __init__(self):
                self.coef=None
                self.intercept=None
                self.n=None
            #Fit simple linear regresion model
            def fit(self,x,y):
                self.coef,self.intercept=np.polyfit(x,y,1)
                self.n=len(x)
                self.x=np.copy(x)
                self.y=np.copy(y)

            #Get confidence interval on parameters
            def get_ci(self,confidence=0.95):
                if self.n==None:
                    print("ERROR, MODEL NOT FITTED")
                    return -1

                if self.coef is not None and self.n>2:
                    ci=[]
                    t=stats.t.ppf(1.0-(1.0-confidence)/2,self.n-2)
                    self.sc=np.sqrt(np.sum((self.coef*self.x+self.intercept-self.y)**2)/(self.n
                    self.sc/=np.sqrt(np.sum((self.x-np.mean(self.x))**2))
                    self.si=self.sc*np.sqrt(np.mean(self.x**2))

                    ci=np.zeros((2,2))
                    ci[0,0]=self.coef-self.sc*t
                    ci[0,1]=self.coef+self.sc*t
                    ci[1,0]=self.intercept-self.si*t
                    ci[1,1]=self.intercept+self.si*t

                else:
                    ci=[]
                return ci

            #Prediction function. Pass confidence level as ci to get confidence interval
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    def predict(self,x,ci=None):
        if self.n==None:
            print("ERROR, MODEL NOT FITTED")
            return -1

        pred=self.coef*x+self.intercept
        if ci is not None:
            t=stats.t.ppf(1.0-(1.0-ci)/2,self.n-2)
            s=np.sum((self.coef*self.x+self.intercept-self.y)**2)/(self.n-2)
            s=np.sqrt(s*(1.0/self.n+(x-np.mean(self.x))**2/np.sum((self.x-np.mean(self

            return pred, [pred-t*s,pred+t*s]
        else:
            return pred


import matplotlib.pyplot as plt
np.random.seed(0)
x=np.random.random(size=(10,))
y=3.0*x+np.random.normal(0.0,0.1,size=(10,))

xp=np.linspace(-0.5,1.5,201)

#Create regressor object
slr=SLR()

#Fit model
slr.fit(x,y)

#Get 95% confidence interval
ci=slr.get_ci(0.95)
print("95% Confidence interval on slope: " + str(ci[0,:]))
print("95% Confidence interval on intercept: " + str(ci[1,:]))

#Plot prediction. 95% confidence interval
yp,[yp_low,yp_high] = slr.predict(xp, ci=0.95)

plt.plot(xp,yp)
plt.plot(x,y,'.')
plt.fill_between(xp,yp_low,yp_high,alpha=0.5)
plt.show()
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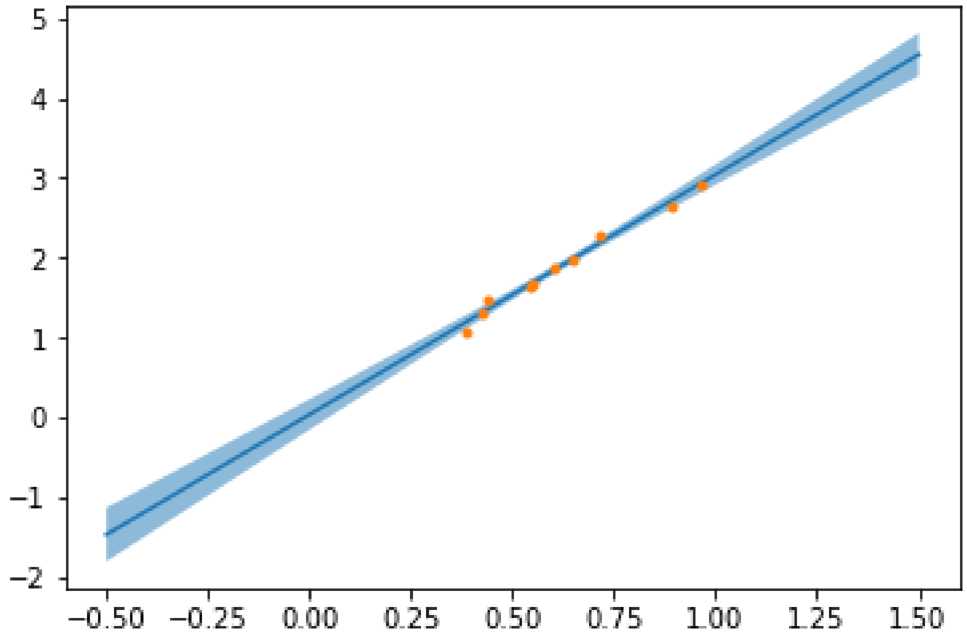
95% Confidence interval on slope: [ 2.7100061   3.30510339]
95% Confidence interval on intercept: [-0.15585331  0.22667859]
```



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In [3]: np.random.seed(0)
        x=np.random.random(size=(100,))
        y=3.0*x+np.random.normal(0.0,0.1,size=(100,))

        xp=np.linspace(-0.5,1.5,201)

        #Create regressor object
        slr=SLR()

        #Fit model
        slr.fit(x,y)

        #Get 95% confidence interval
        ci=slr.get_ci(0.95)
        print("95% Confidence interval on slope: " + str(ci[0,:]))
        print("95% Confidence interval on intercept: " + str(ci[1,:]))

        #Plot prediction. 95% confidence interval
        yp,[yp_low,yp_high] = slr.predict(xp, ci=0.95)

        plt.plot(xp,yp)
        plt.plot(x,y,'.')
        plt.fill_between(xp,yp_low,yp_high,alpha=0.5)
        plt.show()
```

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95% Confidence interval on slope: [ 2.92442501  3.06296199]
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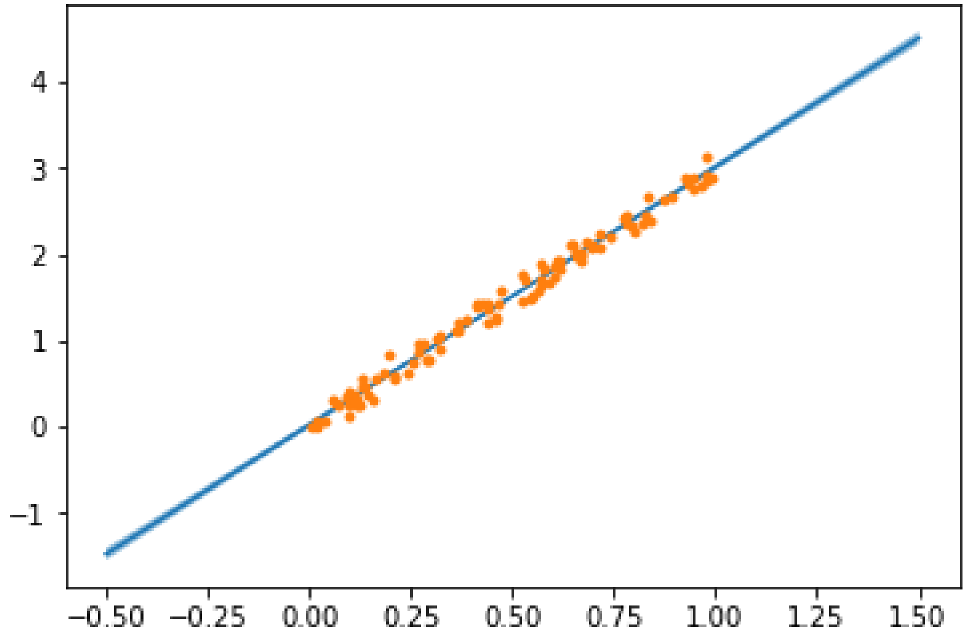
95% Confidence interval on intercept: [-0.01614312  0.06057333]
```



Importamos las dependencias

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In [4]: import numpy as np
        import scipy.stats as stats
```

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In [ ]: Creamos la clase SLR con tres métodos:
            - fit
            - get_ci
```