Multiple Linear Regression

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Multiple Regression Models

- Probabilistic models that include more than one independent variable are called multiple
 - Y = B0 + B1x1 + B2x2 + ... Bkxk + e0
 - B1 determines the contribution of the independent variable x1 0
 - Ex. X1 = advertising expenditure 0
 - X2 = number of sales competitors
 - X3 = (x1)^2
 - X4 = 1 if TV advertising, 0 if not
 - X3 term is a higher order term because it is a quantitative variable squared Ο
 - X4 term is a coded variable representing a qualitative variable Preview Page Notemptions for Random Error e Mean equal to 0 Ovariance equal to sigma^2 Normal distribution 0

Estimating and Making Inferences about the B Parameters

- A model that includes terms only for quantitative independent variables is called a first-o
 - X1, x2, ... Xk are not functions of other independent variables 0
 - B1 represents the slope of the line relating y to x1 when all other x's are held fixed Ο
- Estimator of sigma^2 for a multiple regression model with k independent variables •
 - $S^2 = SSE/(n number of estimated B parameters) = SSE/(n-(k+1))$ 0
- The effect of the independent variable xi on the mean is independent of all the other ind model
- A 100(1 α)% confidence interval for a B parameter
 - Bi-hat +/- t(sub $\alpha/2$)s(sub Bi-hat) 0
 - T(sub $\alpha/2$) is based on n (k + 1) degrees of freedom
 - □ N = number of observations
 - K + 1 = 1 number of B parameters in the model

One-Tailed Test: H0: Bi = 0, Ha: Bi< 0 [or Ha: Bi > 0]

dom errors are independent (in a probabilistic sense)

Test statistic t = Bi-hat/s(sub Bi-hat))

Poinction Pogion: $t < t(sub \alpha)$ [or $t > t(sub \alpha)$ when H_2 : Ri > 0]