Politecnico di Milano
Scuola di Ingegneria Industriale e dell'Informazione
Applied Statistics
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Problem n.3

Cameo is a method of carving materials with a flat plane where two contrasting colours meet, such as for example shells. We want to describe the price of a cameo necklace with respect to its characteristics: the dimension (cm), the weight (g) and the type of processing: ultrasonic cutter or handmade. For the price Y[€] of a cameo, consider the following model:

$$Y = \alpha_g + \beta_g \cdot d + \gamma_g \cdot w + \delta_g \cdot d \cdot w + \varepsilon,$$

where d is the dimension of the cameo, w is the weight, $g = 1, 2$ describes the type of processing (1=handmade, 2=ultrasonic) and $\varepsilon \sim N(0, \sigma^2)$. Based on the data contained in `cameo.txt` answer the following questions.

a) Estimate the parameters of the model and report them.

b) Having verified the needed assumptions, perform a test of level 5% to verify if the factor *processing* has a significant impact on the cost of the cameo.

c) Perform any other test that you consider appropriate to reduce the model.

d) Comment the goodness of fit of the chosen model.

e) Compute the pointwise estimate for the price of an handmade cameo with $d = 10$cm and $w = 80$g. Is the prediction reliable?

Upload your results here:
`https://forms.office.com/Pages/ResponsePage.aspx?id=K3EXCvNtXUKAjjCd8ope6-9AS0GWf2lHjvGX24HiqFVUQkhaUU0yQUs0Q0gyQlpHUVY1UEg2UUc4SS4u`