

1) Improved anesthetics are developed by first studying their effects on animals. In a study, $n = 19$ dogs were given pentobarbital. Then each dog received $p = 4$ treatments. Let CO_2 be carbon dioxide, and let H be halothene. Treatment 1 was high CO_2 without H. Treatment 2 was low CO_2 without H. Treatment 3 was high CO_2 with H. Treatment 4 was low CO_2 with H. The milliseconds between heartbeats was measured for each treatment. Do the four step repeated measurements test if $T_R^2 = 116$. Show how an F table is used.

JW
218-220

i) $H_0 \mu_y = 0 \quad H_A \mu_y \neq 0$

ii) $T_R^2 = 116$

iii) $\frac{n-p+1}{(n-1)(p-1)} T_R^2 = \frac{19-4+1}{(19-1)(4-1)} 116 = 34.370$

pval $\approx P(34.37 < F_{3,16}) < 0.05$

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| 16 | 3.24 |
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non tech
conclusion
or
S

iv) reject H_0 the 4 treatment means are different (or not equal)

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2) Data for radiation from microwave ovens had $n = 42$ and variables $X_1 =$ radiation measurement with microwave oven door closed and $X_2 =$ radiation measurement with microwave oven door open. For this data set, $\bar{x} = (0.564, 0.603)^T$. Suppose $\mu_0 = (0.562, 0.589)^T$ and $T_C^2 = 1.30$. Perform the one sample Hotelling's T^2 test.

JW
180-1

i) $H_0 \underline{\mu} = \underline{\mu}_0 \quad H_1 \underline{\mu} \neq \underline{\mu}_0$

ii) $T_C^2 = 1.3$

iii) $\frac{n-p}{(n-1)p} T_C^2 = \frac{42-2}{(42-1)(2)} 1.3 = 0.634$

pval = $P(0.634 < F_{2,40}) > 0.05$

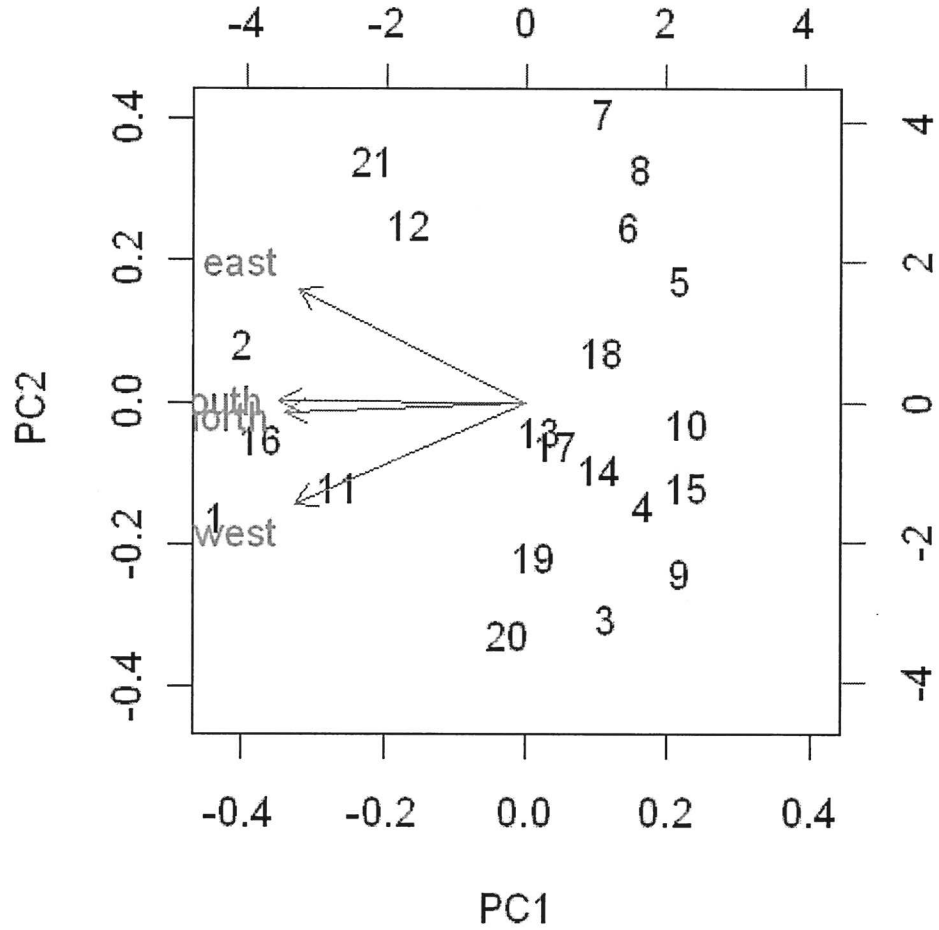
| | |
|----|------|
| | 2 |
| 30 | 3.32 |
| ∞ | 3.0 |

iv) fail to reject H_0 , $\underline{\mu} = \begin{pmatrix} 0.562 \\ 0.589 \end{pmatrix}$

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or there is not enough evidence to conclude $\underline{\mu} \neq \begin{pmatrix} 0.562 \\ 0.589 \end{pmatrix}$.

2ND →



3) The above biplot is for the cork data where weights of cork deposits for 28 trees were recorded in the four directions x_1 =north, x_2 =east, x_3 =south and x_4 = west.

a) From the biplot, why is the first principal component roughly an average of the four variables?

the 4 lengths to the left are about the same (and directions) or in the PC1 direction

b) From the biplot, which two variables are the most important for the second principal component?

east and west

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(North and south values are near 0)