1. A certain species of plant produces a flower that is either red, pink, white or on rare occations blue. Form an analysis of the plants genes it is possible to calculate the the probability of a red flower is $\frac{1}{2}$, the probability of white is $\frac{3}{8}$ and the probability of a pink flower is $\frac{3}{32}$. A gardener grow 20 of these plants and was pleasantly suprised to see 5 blue flowers, 10 red, 3 white and 2 pink. Calculated the probability of this event.

(Please use formulae on the next page if you need. Thank you.)

Formulae

- $\mu_X = \begin{cases} \sum_{x \in S_X} \sum_{y \in S_Y} x f(x,y) & \text{if } X, Y \text{ are discrete} \\ \int_{x \in S_X} \int_{y \in S_Y} x f(x,y) dx dy & \text{if } X, Y \text{ are continuous} \end{cases}$
  similarly for μ_Y
- $\sigma_X^2 = E[(X - \mu_X)^2] = \begin{cases} \sum_{x \in S_X} \sum_{y \in S_Y} (x - \mu_X)^2 f(x,y) & \text{if } X, Y \text{ are discrete} \\ \int_{x \in S_X} \int_{y \in S_Y} (x - \mu_X)^2 f(x,y) dx dy & \text{if } X, Y \text{ are continuous} \end{cases}$
  similarly for σ_Y^2. Note that $E[(X - \mu_X)^2] = E[X^2] - \mu_x^2$.
- Marginal distribution in the x direction is given by:

$$f_1(x) = \begin{cases} \sum_{y \in S_Y} f(x,y) & \text{if } X, Y \text{ are discrete} \\ \int_{y \in S_Y} f(x,y) dy & \text{if } X, Y \text{ are continuous} \end{cases}$$

- Marginal distribution in the y direction is given by:

$$f_2(y) = \begin{cases} \sum_{x \in S_X} f(x,y) & \text{if } X, Y \text{ are discrete} \\ \int_{x \in S_X} f(x,y) dx & \text{if } X, Y \text{ are continuous} \end{cases}$$

- The covariance between X and Y is given by:

$$\begin{aligned} \text{Cov}(X,Y) &= E[(X - \mu_X)(Y - \mu_Y)] \\ &= \begin{cases} \sum_{x \in S_X} \sum_{y \in S_Y} (x - \mu_X)(y - \mu_Y) f(x,y) & \text{if } X, Y \text{ are discrete} \\ \int_{x \in S_X} \int_{y \in S_Y} (x - \mu_X)(y - \mu_Y) f(x,y) dx dy & \text{if } X, Y \text{ are continuous} \end{cases} \end{aligned}$$

  Note that $E[(X - \mu_X)(Y - \mu_Y)] = E[XY] - \mu_X \mu_Y$.
- The linear correlation coefficient of X with Y is given by:

$$\rho = \frac{\text{Cov}(XY)}{\sigma_X \sigma_Y}$$

- The least squares regression line (vertical residuals) has the equation:

$$y = \mu_Y + \rho \frac{\sigma_X}{\sigma_Y}(x - \mu_X)$$

Filename: Q1
Directory: C:\Documents and Settings\Dong Won Woo.D62TQS71.001\Desktop
Template: C:\Documents and Settings\Dong Won Woo.D62TQS71.001\Application Data\Microsoft\Templates\Normal.dot
Title:
Subject:
Author:
Keywords:
Comments:
Creation Date: 1/22/2008 1:59:00 PM
Change Number: 2
Last Saved On: 1/22/2008 2:24:00 PM
Last Saved By:
Total Editing Time: 2 Minutes
Last Printed On: 1/22/2008 2:24:00 PM
As of Last Complete Printing
Number of Pages: 2
Number of Words: 10 (approx.)
Number of Characters: 60 (approx.)