

STAT/BIOSTAT 534 Statistical Computing

Homework 6

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Problem 1 (50 points)

You need to write a recursive function that calculates the determinant of an $n \times n$ matrix $A = (a_{ij})$. The algorithm should proceed as follows.

- If $n = 1$, then $\det(A) = a_{11}$.
- If $n = 2$, then $\det(A) = a_{11}a_{22} - a_{12}a_{21}$.
- If $n \geq 3$, the determinant of A is a function of the determinants of n matrices of dimension $(n - 1) \times (n - 1)$:

$$\det(A) = \sum_{j=1}^n a_{ij}(-1)^{i+j}\det(A_{-(i)(j)}).$$

This decomposition holds for any $i \in \{1, \dots, n\}$. Here $A_{-(i)(j)}$ denotes the submatrix formed from A by removing the i -th row and the j -th column.

Your “main.cpp” program should calculate/output the value of the determinant of the matrix saved in the file “mybandedmatrix.txt”.

Problem 2 (25 points)

Transform the function `AddRegression` I shared with you in the function:

```
void AddRegression(int nMaxRegs,LPRegression regressions,
                  int lenA,int* A,double logmarglikA)
```

This function retains only “nMaxReg” regressions having the largest marginal likelihood. This means that, after a new regression is added, the regressions with the smallest marginal likelihood are deleted from the linked list. Please share your code with me and provide the output in your write-up.

Problem 3 (25 points)

Use the function “AddRegression” from Problem 2 to find the best 10 regressions with at most two predictors. The best regressions have the largest marginal likelihood.