Singular Value Decomposition

This program computes the *Singular Value Decomposition* of a $m \times n$ matrix A, that is it finds an orthogonal $m \times m$ matrix U, a $m \times n$ matrix D, whose non-zero elements are located on its main diagonal, and a orthogonal $n \times n$ matrix V such that $UDV^t = A$. The program also computes the generalized inverse or pseudo-inverse matrix of A.

The use of the program will be explained in the following example. We store in a the matrix

$$a = \begin{bmatrix} 3 & 1 & 2 & 1 & 2 \\ 1 & 2 & 3 & 0 & 5 \\ 2 & 1 & 5 & 0 & 2 \\ 1 & 2 & 1 & 1 & 1 \end{bmatrix}$$

Then we run the program using the instruction

$$svd(a,\ ''u\,'',\ ''d\,'',\ ''v\,'',\ ''g\,'')$$

The following screens show the result of the computation.

matrix u

matrix d

matrix v

matrix $u * d * v^t$

matrix g

matrix $a * g * a$