

Symbolic LU Decomposition Using Large Expression Management

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Abstract

During symbolic computation, it is common for the expressions generated to grow very large. In many cases, the expressions grow so large that their sizes prevent symbolic computations from completing. For example, in MAPLE, if you type

```
> with(LinearAlgebra):  
> n := 6;  
> A := Matrix(n,n,symbol=m):  
> (P, L, U) := LUdecomposition(A);
```

then you will find the expressions for L and U are very lengthy. More importantly, if you repeat the above using $n := 10$ instead of $n := 6$, you will find the second computation does not finish.

Although the occurrence of large expressions causes difficulties in many areas of symbolic computation, our talk concentrates on applying techniques of large-expression management to LU decomposition.

The work described in our talk has two goals. The first goal is to facilitate symbolic LU decomposition, for example, completing the case $n = 10$ described above. The second goal is to add some higher-level tools to the low-level tools supplied by the MAPLE package `LargeExpressions`.