

Rcpp: Seamless R and C++ integration

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Abstract

The **Rcpp** package simplifies integrating C++ code with R. It provides a consistent C++ class hierarchy that maps various types of R objects (vectors, functions, environments, ...) to dedicated C++ classes. Object interchange between R and C++ is managed by simple, flexible and extensible concepts which include broad support for popular C++ idioms from the Standard Template Library (STL). Using the **inline** package, C++ code can be compiled, linked and loaded on the fly. Flexible error and exception code handling is provided. **Rcpp** substantially lowers the barrier for programmers wanting to combine C++ code with R.

We discuss and motivate the two APIs provided by **Rcpp**: the older ‘classic’ API introduced with the early releases of the package, and the ‘new’ API that results from a recent redesign. We provided simple examples that show how **Rcpp** improves upon the standard R API, demonstrate performance implications of different program designs and show how R can take advantage of modern C++ programming techniques, including template metaprogramming (TMP). The combination of modern C++ together with the interactive environment provided by R creates a very compelling combination for statistical programming.

Keywords: Foreign function interface, R, C++, Standard Template Library (STL)