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The Atlas of Lie Groups and Representations: Scope and Successes

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The main goal of the Atlas of Lie Groups and Representations project is to compute the unitary dual of a given reductive real Lie group from the input of the root datum corresponding to its complexification G . An earlier version of the software was written by the late Fokko du Cloux. That version computes the representation theories of all the real forms of a given G and provided an implementation of the Kazhdan-Lusztig-Vogan algorithm. This implementation was used to compute the KLV polynomials for the split real form of the exceptional group E_8 , a result whose announcement last March was intensely covered by both the national and international media.

My own work within this international group involves developing and implementing algorithms for computing the unitary dual in C++. I work very closely with David Vogan at MIT. I will present some of the main ideas behind the current version of the software. I will also provide some examples. This talk is in memory of Fokko du Cloux, the mathematician who, until eight months ago, was the lead developer. He died in November, 2006.