Computing tables of elliptic curves

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In modern computational number theory, the existence of tables of elliptic curves plays a central role. They allow to test many open conjectures and give some hint on the behavior of rank and many other quantities of elliptic curves as the conductor grows.

The main contribution on elliptic curves' tables are Cremona's tables, which are based con computing modular symbols and the action of the Hecke operators on them. The problem is that elliptic curves correspond to rational eigenvalues, while most eigenvalues are not rational, so the cost of computing the whole Hecke operators is too big for the few curves obtained. There is a variant due to Cremona-Lingham, which consists on computing j-invariants over number fields, and have some computational cost. In this talk we will present a different approach which consists on using information of the residual 2-adic representation. This allows to speed up computations assuming some conjectures on minimal models up to isogenies. This is a work in progress, and the ideas presented should be generalizable to arbitrary number fields.