Rational reconstruction of representations

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Abstract

For any natural number m, let $\mathbb{Q}_m$ be the set of rationals a/b with b coprime to m, and let θ be the map $\mathbb{Q}_m \to \mathbb{Z}_m$ which sends a/b to $\bar{a}/\bar{b}$, its reduction modulo m. *Rational reconstruction* is the process of finding a 'small' θ-preimage of an element of $\mathbb{Z}_m$. We will outline a well-known technique for rational reconstruction using Euclid's algorithm. Then, using an example, we will show how rational reconstruction can dramatically speed up the decomposition of a group representation into its irreducible constituents.