

Quiver techniques in representation theory

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Abstract

In general it is not easy to describe the projective or injective objects in a given category, not even when we are working with the category of modules over a ring.

Our aim is to describe this type of modules when the ring is a finite dimensional algebra over an algebraically closed field.

The idea is to represent the category of modules by a simpler category described by a quiver. Quivers are a type of oriented graph that are perfectly adapted to this aim.

Intuitively we can construct an algebra from a quiver and a quiver from an algebra. So, we want to describe a categorical way to connect these two methods for studying modules. This categorical connection comes from the representation theory of quivers, and with it we can find a lot of information on the category of modules. In particular it is easy to compute simple, projective and injective modules over an algebra.