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quhomology: Calculation of Homology of Quandles, Racks, Biquandles and Biracks

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Software

- Review
- Repository
- Archive

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Summary

In knot theory several knot invariants have been found over the last decades, particularly in (Fenn and Rourke 1992). Quhomology calculates the rack, quandle and degenerate homology groups of racks and biracks, based primarily on the theory described in (Fenn 2014). It works for any rack/quandle with finite elements where there are homology coefficients in Zk. The up and down actions can be given either as a function of the elements of Zk or provided as a matrix. When calculating a rack, the down action should coincide with the identity map. We have provided actions for both the general dihedral quandle and the group quandle over S3. We also provide a second function to test if a set with a given action (or with both actions) gives rise to a quandle or biquandle. The program is provided as an R package and can be found at https://github.com/ansgarwenzel/quhomology or a persistent version at (Wenzel 2017). A corresponding paper can be found at (Fenn and Wenzel 2018) and a wider introduction can be found in (Wenzel 2016).

Reuse Potential

This software can be used to calculate the homology groups of most racks and biracks. It is very easy to adapt for application to other eracks/biracks. Furthermore we believe that it can easily be extended to the calculation of Cohomology groups. Finally, the possibility of quickly identifying if a given action/set of actions gives rise to a rack/birack, is very useful.

Requirements

The program requires the R standard installation (R Core Team 2013, Venables and Ripley (2002)), together with the packages Matrix (Bates and Maechler 2014) and numbers (Borchers 2014).

References

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