

Message Passing Simplicial Network on SRG

Amadou Keita

African Master in Machine Intelligence (AMMI), AIMS-Senegal

Bootcamp_2

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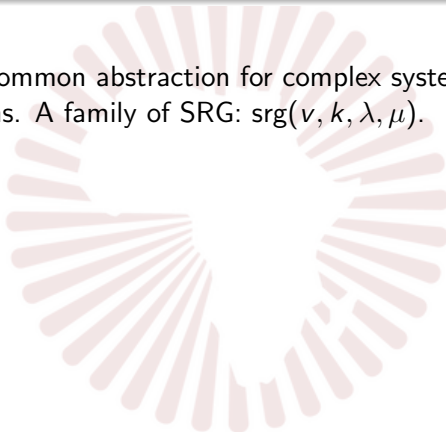
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Introduction

Problem and Approach

Graphs are a common abstraction for complex systems of relations and interactions. A family of SRG: $\text{srg}(v, k, \lambda, \mu)$.



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Simplex, WL

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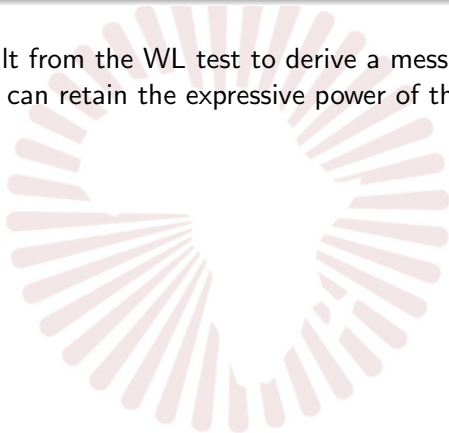
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- A simplex can have an orientation but not for SRG.

Simplicial WL Test

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This test is built from the WL test to derive a message-passing procedure that can retain the expressive power of the test[1].



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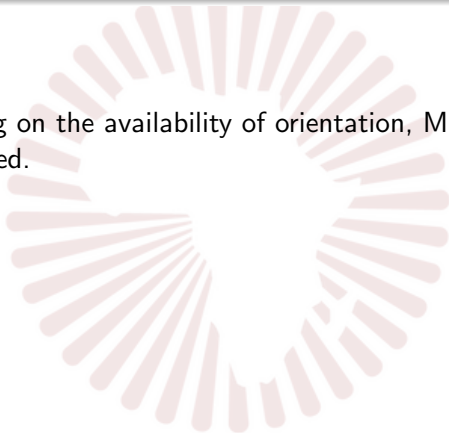
Simplicial WL Algorithm

- 1 Given a simplicial complex \mathbb{K} , all the simplices $\sigma \in \mathbb{K}$ are initialised with the same colour.
- 2 Given the colour c_σ^t of simplex σ at iteration t , compute c_σ^{t+1} by perfectly hashing the multi-set of colours belonging to the adjacent simplices of σ .
- 3 The algorithm stops once a stable colouring is reached. If the colour histogram is not the same, there's no isomorphism.

Message Passing Simplicial Network

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- The model does message aggregation on the different boundary adjacency conditions of simplices in \mathbb{K} .
- Just as in k -WL tests, the update operation takes into account the different types of incoming messages and the previous colour of the simplex and then hash the multi-set of colours.

Data and Implementation

- Strongly regular graphs of at most 35 vertices were studied.
- Implementation incomplete...

References



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arXiv preprint arXiv:2103.03212, 2021

Acknowledgements



Thanks for your attention!