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«Evolutionary Algorithm for Automated Formation of Recurrent Neural Networks»

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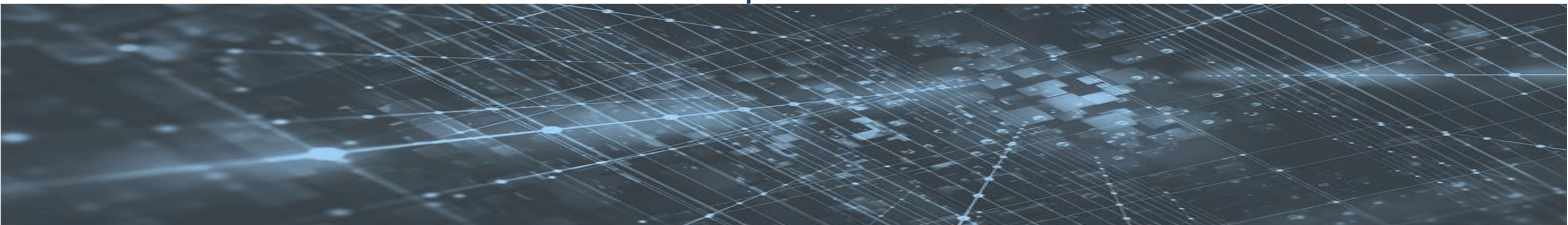
Problem statement

- Now, there are many automated ANN design systems, however, they are focused on the feed-forward networks and cannot be used to build RNNs. In connection with all of the above, the topic of computer aided RNN design becomes an important scientific problem.
- The present paper considers a modification of the evolutionary algorithm for the automated formation of artificial neural networks of direct propagation, which helps build recurrent neural networks.

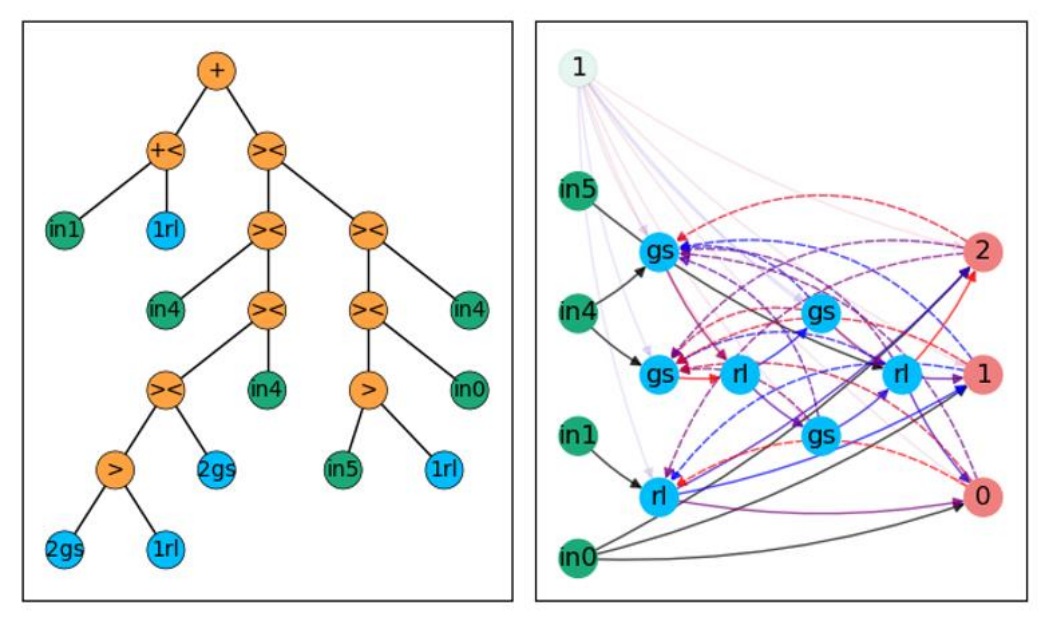


Solution methods

- The peculiarity of the algorithm lies in the network structure encoding in the form of a tree allowing the network structure to be represented more compactly, that well correlates with text analysis tasks, the dimensions of which vary from hundreds to thousands of features.
- Operations forming feedbacks have been added to the existing approach.
- To estimate the value of the fitness function of an individual, the neural network must first be trained on the problem being solved. This paper proposes the use of a self-configuring genetic algorithm.
- To test the approach, the problem information were solved.

Conclusions

Results, implementation



An example of a built model. Tree (left) and neural network (right)

In the present paper, we have described and tested the approach of automated formation of RNNs using evolutionary optimization methods. The approach extends the existing method of automated generation of direct propagation ANNs, enabling to build recurrent connections between the neurons of the network, which helps process sequential information. The network structure is configured by the self-configuring genetic programming method, and the weighting coefficients are configured by the self-configuring genetic algorithm.

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