Dill maps in topological spaces defined via edit distances

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Résumé

Dill maps were defined by I. Torma and V. Salo in 2015 and generalize both substitutions and cellular automata. In this work, we characterize dill maps by a theorem similar to the Curtis-Hedlund-Lyndon theorem for cellular automata. Then we study the well-defined dill maps over quotient topological spaces defined via pseudo-metrics based on edit distances such as the Besicovitch and Weyl spaces.

We proved that only constant or constant-length dill maps induce well-defined maps over the Besicovitch and Weyl spaces.

On the other hand, by replacing the Hamming distance in the Besicovitch pseudo-metric with the Levenshtein distance, which calculates the minimum number of edit operations to transform one finite word into another, we found that all dill maps induce well-defined maps over this space. In contrast, by replacing the Hamming distance in the Weyl pseudo-metric with the Levenshtein distance, we found that not all dill maps are well-defined. Therefore, we provide a characterization for well-defined dill maps over this space.

Finally, we study expansivity and equicontinuity of particular dill maps (such as cellular automata and substitutions) over these spaces, and we prove, in particular, that there are no expansive dill maps over the Besicovitch-like space.

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