Semi-topological properties of the K-topological version of the Jordan curve theorem and its applications

SANG-EON HAN

Department of Mathematics Education, Jeonbuk National University, Jeonju-City Jeonbuk, 54896, Republic of Korea sehan@jbnu.ac.kr

This talk initially introduces semi-topological properties of the Khalimsky (K-, for brevity) topological version of the classical Jordan curve theorem. Let C_K^l be a simple closed K-curve with l elements in (\mathbf{Z}^2, κ^2) , i.e., the K-topological plane. Then every C_K^l separates (\mathbf{Z}^2, κ^2) into exactly two nonempty components that may be neither open nor closed in (\mathbf{Z}^2, κ^2) . Hence we need to investigate semi-topological features of C_K^l and $\mathbf{Z}^2 \setminus C_K^l$ in (\mathbf{Z}^2, κ^2) . We first show that not every C_K^l is always semi-open or semi-closed in (\mathbf{Z}^2, κ^2) . Second, we find a condition for C_K^l to be either semi-open or semi-closed in (\mathbf{Z}^2, κ^2) . Third, we obtain a partition of \mathbf{Z}^2 , i.e., $\{I(C_K^l), O(C_K^l), C_K^l\}$ and prove that each of $I(C_K^l)$ and $O(C_K^l)$ is semi-closed and it need not be semi-open in (\mathbf{Z}^2, κ^2) , where $I(C_K^l)$ and $O(C_K^l)$ are called an inside and outside of C_K^l , respectively.

Finally, based on the above facts [1], in rough set theory we put an emphasis on semitopological structures of the Khalimsky (K-, for brevity) topological rough approximations [2].

References

- [1] Sang-Eon Han, Semi-topological properties of the K-topological version of the Jordan curve theorem, *Results in Mathematics* **79**(7) (2024) 1-20.
- [2] Sang-Eon Han, Topological aspects of the Khalimsky topological rough approximations, submitted, Topology and its Applications (2024) 1-31.