
NEW FIXED POINT THEOREMS ON DIGITAL RECTANGULAR METRIC SPACE AND APPLICATION OF LACTIC ACID FERMANTATION

Simge ÖZTUNÇ^{1,*}, Aysun ERDOĞAN SERT²,

¹*Department of Mathematics, Manisa Celal Bayar University, 45140, Manisa, Türkiye*

²*Department of Mathematics, Manisa Celal Bayar University, 45140, Manisa, Türkiye*

ABSTRACT

In this study we consider digital images with adjacency relation. We provided an example that is a digital rectangular metric but not a digital metric. Moreover, we examined the example of lactic acid fermentation in a digital rectangular metric space and define a contraction mapping that preserves homotopy equivalence. Furthermore, we prove a Chatterjea-type fixed point theorem in a digital rectangular metric space and demonstrate that the contraction mapping which we define within the digital topological structure of lactic acid fermentation satisfies the Chatterjea-type contraction condition.

Keywords Digital image · Rectangular metric · Fixed point

References

- [1] Boxer L. Properties of Digital Homotopy, J. Math. Imaging Vis., 22:19-26, 2005.
- [2] Chatterjee, S.K., Fixed point theorems, Comptes rendus de l'Academie Bulgarees Sciences, 25: 727-730, 1972.
- [3] Han S.E. Banach Fixed Point Theorem from the Viewpoint of Digital Topology, J. Nonlinear Sci. Appl., 9: 895-905, 2015.
- [4] Kong T.Y., Rosenfeld A., Topological Algorithms for the Digital Image Processing, 19:1-292,1996.
- [5] Park C., Ege O., Kumar S., Jain, D., Lee, J. R., Fixed point theorems for various contraction conditions in digital metric spaces. Journal of Computational Analysis and Applications, 26(8): 1451-1458, 2019.

*Corresponding Author's E-mail: simge.oztunc@cbu.edu.tr