Digital-topological k-group structures on digital objects

Sang-Eon Han[1]

sehan@jbnu.ac.kr

Motivated by the typical topological group, we have recently developed the notion of a digital-topological k-group (DT-k-group for brevity) derived from a digital object $X(\subset \mathbb{Z}^n)$ with digital k-connectivity, i.e., (X, k). In relation to this work, we need the most suitable adjacency relation in a digital product $X \times X$ such as a G_{k^*}-adjacency relation which can support the G_{k^*}-connectedness of the digital space $(X \times X, G_{k^*})$, (G_{k^*}, k)-continuity of the map $\alpha : (X \times X, G_{k^*}) \to (X, k)$, and k-continuity of the inverse map $\beta : (X, k) \to (X, k)$.

We prove that $(\mathbb{Z}^n, k, +, \cdot)$ is an infinite DT-k-group and $(SC_k^{n,l}, *, \star)$ is a finite DT-k-group, where the operations $*$ and $\star$ are particularly defined.

Given two DT-k_i-groups $(X_i, k_i, *_i, \star_i)$, $i \in \{1, 2\}$, assume the digital product $X_1 \times X_2$. Then we can raise a query. Under what k-adjacency of $X_1 \times X_2$ do we have the product property of the given two DT-k_i-groups $(X_i, k_i, *_i, \star_i)$, $i \in \{1, 2\}$?

Finally, we will suggest some applicable areas in the fields of applied mathematics and computer science.

[1]The first author was partially supported by NRF (National Research Fund of Korea).