

## ABSTRACT

Topological Data Analysis (TDA) is an important aspect in the field of topological data theory since the 21st century's first decade. Modern TDA utilizes the structural characteristics of Big Data (BD), otherwise known as point cloud data sets. Topology and Geometry are tools used to analyze highly complex and multi-dimensional data by creating a summary of these characteristics to uncover hidden features in these datasets, while preserving feature relationships within the data. Describing topological Data Points (TDP) is very intricate due to the nature of BD. This makes it difficult to locate Big Data Sets (BDS) particularly in a general topological space setting. Because of the structure in  $T_2$ -spaces, it is even more difficult to locate these BDS in Hausdorff spaces. The objectives of the study include; to characterize TDPs in Hausdorff spaces, to locate BDS in Hausdorff Spaces, and to establish distribution patterns of TDPs in Hausdorff spaces. The methodology involved use of BDS, separation criterion of Hausdorff Spaces, Artificial Intelligence (AI) and Machine Learning (ML) techniques, as well as development of algorithms and simulations using python. The results show that the space of a TDP is compact, and has no less than one closed TDP. Moreover, the set of all condensation points of a TDS is infinite and has infinite cardinality. Lastly, Covid-19 cases are densely distributed in regions experiencing extremely low temperatures. The results of this study are useful to policy makers in the health sector in controlling Covid-19. This work is also a contribution of knowledge in the field of TDA.