Generalization of similar data retrieval from natural plasma wave spectrum

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As total amount of measured data by scientific spacecraft is drastically increasing, it is necessary for researchers to develop new computation methods for the efficient analysis of the enormous dataset because it is almost impossible to survey all datasets manually. In order to solve this problem, we have been developed an algorithm of similar data retrieval using a database system and Java servlets. In the present study, we propose a more generalized system for similar data retrieval from enormous datasets on plasma wave observation. This algorithm was applied to the spectrum data obtained by the WFC instruments onboard KAGUYA spacecraft.

In our system, we store several kinds of key descriptors in order to describe distinctive feature of wave spectrum in the database. In the present study, we calculated these key descriptors using DCT in order to describe the characteristics of plasma wave spectrum. We also re-considered the method of normalization of the key descriptors for the purpose of system generalization. We evaluated the performance of our system and concluded that the developed algorithm works well and the computation time is also small enough for practical use.

We also generalized the user interface and the coding in the system so that it is demonstrated that varieties of datasets other than wave spectra data will be easily applied to the proposed system.