

Environment Study of AGNs at $z = 0.3$ to 3.0 using the Japanese Virtual Observatory



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Abstract:

We present a science use case of Virtual Observatory, which is actually achieved to examine environment of AGN up to redshift of 3.0. We used the Japanese Virtual Observatory (JVO) to obtain the Subaru Suprime-Cam images around known AGNs. According to the hierarchical galaxy formation model, AGNs are expected to be found in environment of higher galaxy density than that of typical galaxies. The current observations, however, indicate that AGNs do not reside in particularly high density environment. We investigated $\sim 1,000$ AGNs, which is about ten times larger samples than previous studies covering redshifts larger than 0.6. We successfully found significant excess of galaxies around AGNs at redshifts of 0.3 through 1.8.

If this work was done in a classical manner, that is, raw data were retrieved from the archive through a web interface in an interactive way and the data were reduced in a local poor machine, it might have taken several years to finish it. Since the Virtual Observatory system is accessible through the standard interfaces, it would be easy to query and retrieve observed data in an automatic way. We have constructed a pipeline for retrieving the data and calculating the galaxy number density around a given coordinate. This procedure was executed in parallel on ~ 10 quad core PCs, and it took only one day for obtaining the final result.

Our result implies that the Virtual Observatory provides astronomers with a powerful tool to conduct a data-intensive astronomical research.

