feature in the metallicity between cEw and cEw/o can suggest that two different scenarios can be provided in the formation of cEs. cEw would be the remnant cores of the massive progenitor galaxies that their outer parts have been tidally stripped by massive neighbor galaxies (i.e., nurture origin). On the other hand, cEw/o are likely to be faint-end of early-type galaxies maintaining in-situ evolution (i.e., nurture origin).

[포 GC-18] Deep survey using deep learning: generative adversarial network

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There are a huge number of faint objects that have not been observed due to the lack of large and deep surveys. In this study, we demonstrate that a deep learning approach can produce a better quality deep image from a single pass imaging so that could be an alternative of conventional image stacking technique or the expensive large and deep surveys.

Using data from the Sloan Digital Sky Survey (SDSS) stripe 82 which provide repeatedly scanned imaging data, a training data set is constructed: g-, r-, and i-band images of single pass data as an input and r-band co-added image as a target. Out of 151 SDSS fields that have been repeatedly scanned 34 times, 120 fields were used for training and 31 fields for validation. The size of a frame selected for the training is 1k by 1k pixel scale. To avoid possible problems caused by the small number of training sets, frames are randomly selected within that field each iteration of training.

Every 5000 iterations of training, the performance were evaluated with RMSE, peak signal-to-noise ratio which is given on logarithmic scale, structural symmetry index (SSIM) and difference in SSIM. We continued the training until a GAN model with the best performance is found. We apply the best GAN-model to NGC0941 located in SDSS stripe 82. By comparing the radial surface brightness and photometry error of images, we found the possibility that this technique could generate a deep image with statistics close to the stacked image from a single-pass image.

천문우주관측기술

[포 AT-01] Control software for temperature sensors in astronomical devices using GMT SDK 1.6.0

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The temperature control of a scientific device is essential because extreme temperature conditions can cause hazard issues for the operation. We developed a software which can interact with the temperature sensor using the GMT SDK(Giant Magellan Telescope Software Development Kit) version 1.6.0. The temperature sensor interacts with the EtherCAT(Ethernet for Control Automation Technology) slave via the hardware adapter, sending and receiving data by a packet. The PDO(Process Data Object) and SDO(Service Data Object), which are the packet interacts with each EtherCAT slave, are defined on the TwinCAT program that enables the real-time control of the devices. The user can receive data from the device via grs(GMT Runtime System) tools and log service. Besides, we programmed the software to print an alert message on the log when the temperature condition changes to certain conditions.

[포 AT-02] Constraining the Evolution of Epoch of Reionization by Deep-Learning the 21-cm Differential Brightness Temperature

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We develop a novel technique that can constrain the evolutionary track of the epoch of reionization (EoR) by applying the convolutional neural network (CNN) to the 21-cm differential brightness temperature. We use 21cmFAST, a fast semi-numerical cosmological 21-cm signal simulator, to produce mock 21-cm map between z=6-13. We design a CNN architecture that predicts the volume-averaged neutral hydrogen fraction from the given 21-cm map. The estimated neutral fraction has a good agreement with its truth value even after smoothing the 21-cm map with somewhat realistic choices of beam size and the