Automate-Observing: A Python Package for Automated Astronomical Observations

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We introduce Automate-Observing, a Python package streamlining the planning and data acquisition processes for astronomical observations. Through the efficient use of various online databases and calculators, Automate-Observing reduces manual effort, optimizes data quality, and provides flexibility for astronomers in their observational endeavors.

I. INTRODUCTION

Observational astronomy has long been dependent on a series of manual, time-consuming tasks for data acquisition and observation planning. To address this, we developed Automate-Observing, a Python package that automates these processes and optimizes observational parameters based on user requirements. The package is freely available and can be accessed on GitHub at `https://github.com/htohfa/Preparation-for-observing-night-with-keck.git`.

II. FEATURES AND FUNCTIONALITY

Automate-Observing operates by interfacing with various online databases and tools. It extracts RA, Dec, and visible magnitude of targets from the NASA/IPAC Extragalactic Database (NED) [1].

The package subsequently determines the best night for observing, taking into account factors like airmass and moon phase. It also computes the necessary exposure time to achieve a specific S/N ratio, defaulting to 50, using the Lick Observatory Exposure Time Calculator [2].

Additionally, Automate-Observing generates an airmass chart for the chosen observation night, using the Roque de los Muchachos Observatory Staralt tool [3] defaulting to Mauna Kea Observatory (Hawaii, USA) as the location of the telescope. This feature helps observers in scheduling their observations at times when the air mass is minimal, maximizing the received signal strength.

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III. USER CUSTOMIZATION AND FLEXIBILITY

In addition to its core features, Automate-Observing provides several customizable options to users. While the package can provide a comprehensive observation plan, it also allows users to only extract RA, Dec, and magnitude information for specific targets, without calculating exposure times. This feature offers flexibility to observers who may have different requirements for their observations.

Moreover, the package's exposure time function is fully customizable. Users can adjust parameters such as the desired S/N ratio, wavelength, maximum iteration, and tolerance. This level of customization allows the observer to adapt the package to their specific requirements and observation conditions, making Automate-Observing a powerful tool for various observational contexts.

IV. IMPACT AND CONCLUSION

Automate-Observing brings a new level of efficiency and customization to the field of astronomical observations. By automating several laborious tasks and providing a suite of customizable options, the package allows astronomers to focus more on analyzing data and less on its acquisition. It not only optimizes the quality of data but also significantly reduces the time invested in the preparation for observations.he Automate-Observing package can be accessed and downloaded from our GitHub repository at `https://github.com/htohfa/Preparation-for-observing-night-with-keck.git`.

In conclusion, Automate-Observing is a comprehensive and flexible Python package that can greatly enhance the observational astronomy processes. Future work could include integrating more databases and calculators to cover a broader range of astronomical objects and observation parameters.

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[1] NASA/IPAC Extragalactic Database (NED). `http://ned.ipac.caltech.edu/`

[2] Lick Observatory Exposure Time Calculator. `http://etc.ucolick.org/web_s2n/lris`

[3] Roque de los Muchachos Observatory Staralt tool. `http://catserver.ing.iac.es/staralt/index.php`