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○ **Advancements in NEO Discovery**

NEAT-R: Near-Earth Asteroid Tracking Reprocessing

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The Near-Earth Asteroid Tracking (NEAT) survey operated from 1995 to 2007, discovered 41,227 minor planets [1, 2], and reported observations of 258 comets. One such comet is shown in Figure 1.

Along with Spacewatch [3], NEAT pioneered techniques used by major asteroid surveys today. To date, only three projects (Linear, Spacewatch, and the Mt. Lemmon Survey) have discovered more minor planets, according to the Minor Planet Center [4]. However, NEAT operated within the technological constraints of its time, and in the intervening years there have been significant advancements in computer hardware and data analysis tools.

We harness this new technology to reprocess these images. Dynamic source extraction software such as Source Extractor [5] provides flexible background subtraction. Source Extractor is also not limited by the fixed-size ratio algorithm originally used by NEAT, and can extract fainter sources that have a smooth point-source function brightness profile. The large number of measured properties of each detection from Source Extractor are fed into machine learning algorithms, which determine parameter boundaries in multidimensional space and can identify asteroids with high confidence [6, 7, 8]. Processing is done using the Deep Thought supercomputer at Olin College.

Comments:

(First author ***cannot*** *attend the conference on Monday due to teaching schedule. Please schedule for another day. Thank you.)*

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Figure 1: Comet 65P/Gunn, observed by the NEAT project from the Palomar site on 22 February 2002 (total m$_V \sim$ 16.5). The frames are registered relative to the background stars. The comet appears as separate red, green, and blue mappings in the exposure owing to its non-sidereal motion.

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