**Declarations**

**1 Title：** The automatic counting of head thrashing and omega turn behavior in *C. elegans* can map the function of motor neurons.

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**3 Abstract：** Model organisms have played a significant role in developing biological sciences and have broad applications in various fields. As a model organism, the nematode *Caenorhabditis elegans* has become instrumental in studying neurodegenerative diseases. Amyotrophic lateral sclerosis is a classic neurodegenerative disease caused by defects in motor neurons. Due to the homology between nematode and human genes, the nematode is a crucial model for investigating the pathogenesis of Amyotrophic lateral sclerosis. Therefore, quantitative analysis of the nematode's locomotion behavior is essential. Among the various movement behaviors of nematodes, head thrashing and omega turn behaviors have been selected as indicators of motor neuron functionality. Then, utilizing a model for head and tail position localization in nematodes, the head and tail positions of the nematode are identified, enabling automated counting of head thrashing and body omega turn behaviors. Comparing the head thrashing and body omega turn behaviors between normal nematodes and those with apparent motor neuron defects confirmed that the frequency of these behaviors was significantly lower in nematodes with motor neuron defects than in those with intact motor neurons. Demonstrating the automated counting results of head thrashing and omega turn behavior in nematodes can serve as indicators to determine the integrity of motor neurons.

**4 Keywords：** *C. elegans*, Head thrashing, Omega turn, Automatic count

**5 Statements and Declarations：**

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