Application of Machine Learning to Identify Stellar Feedback

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Abstract

Stellar feedback (winds and outflows) plays a significant role in both physical and chemical evolution of molecular clouds. This energy and momentum leave identifiable signatures (bubbles and outflows) that affect the dynamics and structure of the cloud. I will introduce a new deep learning method CASI-3D (Convolutional Approach to Structure Identification-3D) to identify stellar feedback signatures in CO data cubes. The CASI models are able to identify all previously identified feedback features in Taurus and Perseus, and identify new feedback structures. Meanwhile, the CASI models indicate that the mass, momentum and energy from feedback are overestimated by a large factor in previous studies. Consequently, feedback is not sufficient to support turbulence in Taurus. I will also discuss multiple astrostatistics that indicate the presence of stellar feedback.

Keywords: stellar feedback, ISM, machine learning, bubbles, outflows

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