James Dawson

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Machine learning and galaxy studies

About me:

I am a PhD student as part of the CDT. My main goals are to develop tools for the big data revolution in astronomy, as we enter the petabyte era, with instruments such as the Square Kilometre Array.

Outside of academia, I am a session drummer with a history of national level competitive swimming. My career aspirations are to become a machine learning expert at the forefront of cyber security or become an astronaut. As such I am a driven individual who is willing to excel in a diverse range of skills.

Project details:

We merge the use of AI with an EAGLE project backend, as a training set, to predict kinematic features of molecular gas in galaxies and test the networks on both simulated test data and real interferometric data. We use the power of deep learning to identify features unattainable to the human eye or standard analysis of interferometric observations and discriminate between levels of ordered gas rotation. The networks developed during this project stand as a base for predicting more dynamic processes of galaxies.

Data intensive skills and interests:

I am primarily interested in big data and the application of artificial intelligence to handle future and current big data challenges. This includes the use of both machine learning and deep learning. I have experience in applying AI to galactic astronomy, exoplanet studies, and server network traffic modelling.

I was first introduced to machine learning at Cavendish Laboratory (Cambridge University) where I did an MSc project in variable star classification for exoplanet detection. Since then I have become passionate about exploring the limits of using AI and I am particularly interested in their application to cyber security and future space missions.

Relevant skills:

- Python
- Deep learning: PyTorch, Tensorflow, CUDA
- Machine learning: scikit-learn
- LaTeX

See my research here: https://sites.google.com/view/jamesmdawson/research

I have utilised the following techniques in my MSc and first year of PhD: Machine learning and deep learning (including: neural networks, CNNs, random forest, and self organising maps), data mining and visualisation through university modules as part of the CDT, Bayes statistics and latent model development for inference.