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APPLICATION OF RESTRICTED BOLTZMANN MACHINES TO ANALYTICAL CHEMISTRY

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Many advances in modern society are due to embedded artificial intelligence. Some of these innovations are voice recognition in phones and personal assistants, image recognition for identifying faces in photos, and digital transcription of handwriting. These advances rely on deep neural networks, some of which are efficiently built with layers of restricted Boltzmann machines (RBMs). RBMs have many potential applications in analytical chemistry for finding features in data. They may be used to transform data and improve the performance for classification and calibration. Some examples will demonstrate the improvement for quantifying fat, moisture, and protein content using near-infrared spectroscopy. Classification of spectra from botanical materials such as cannabis or tea is useful for authentication. The use of RBMs to improve the classification results also shall be demonstrated.

Biography

Peter de Boves Harrington completed his PhD in Analytical Chemistry at University of North Carolina where he worked on "Artificial intelligence methods applied to analytical chemistry". He then held a Research Professorship at Colorado School of Mines where he developed algorithms for identifying bacteria from their mass spectra. Afterwards, he started his career at OHIO where he now directs the Center for Intelligent Chemical Instrumentation. He has invented many chemometric algorithms that are in use today. Recently, he was honored with the Outstanding Research Award for his college and was named a recipient of China's 1,000 Talents. He has published more than 170 papers in peer reviewed journals and is a world-renowned speaker.

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