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# TASK-1.1: THE HISTORY AND TOOLS OF MACHINE LEARNING

**Question:**

How is machine learning used in this environment, and what does it do that humans can't (or would be too time intensive)?

**Data Source:**
Ben Sturm, *"An Examination of International Cuisines through Unsupervised Learning,"* published on *Towards Data Science*, July 12, 2018.

**Answer:**
Machine learning, specifically unsupervised learning, is used in this case study to identify relationships and patterns among international cuisines by analysing ingredient usage. Using a dataset of over 12,000 recipes sourced from the Yummly API, the text data is processed through NLP to extract ingredients and transform them into structured data that can be fed into machine learning algorithms. Key methods like Principal Component Analysis (PCA) and Latent Dirichlet Allocation (LDA) are applied to reveal insights that link particular ingredients to specific cuisine types. PCA, for example, clusters cuisines by ingredient similarities, grouping Asian cuisines like Chinese and Thai due to common ingredients such as soy and rice.

This analysis provides insights that would be challenging and time-intensive for humans to derive manually. While chefs might intuitively understand some connections, machine learning can quantify and visualize these relationships across thousands of recipes, revealing unexpected patterns and associations. For instance, Barbecue and Portuguese cuisines might cluster closely, indicating potential overlaps, which could be valuable for recipe recommendation systems or culinary fusion ideas. In this environment, machine learning enables a scalable, data-driven approach to understanding global cuisines, enhancing personalized recipe suggestions and supporting cross-cultural food exploration.