**The Need for Feature Engineering in the Era of Deep Learning**

The need for feature engineering in the era of deep learning is a highly debatable topic in data science. In short, feature engineering is the discipline of preparing the data required for machine learning. It is both an art and science in itself and is typically quite labor-intensive. Although deep learning has the potential to reduce the need for careful data preparation, it is not desirable to do so. This is because of several factors (Bengio, et al. 2013).

Firstly, machine learning algorithms can significantly benefit from the domain knowledge of the feature engineers. Domain experts can identify which features are most likely to be predictive of the outcome based on their understanding of the subject matter. This insight is crucial in reducing the dimensionality of the dataset. Creating machine learning algorithms based on deep learning without appropriate feature engineering may need to deal with prohibitively large data dimensions, which can take significant time and power to learn.

Secondly, feature engineers can use their domain knowledge to inspect missing data and faulty outliers and provide informed decisions for appropriate corrections. This is possible because of their prior knowledge of the data distributions. The choice of whether to impute, remove, or flag data as missing can significantly influence model accuracy. A deep learning algorithm without the advantage of judicious data cleaning may not perform well compared to traditional machine learning algorithms such as logistic regression and decision trees.

Thirdly, raw data may not provide maximum information for machine learning. Feature engineers can often use feature generation techniques to create new features that can provide more insight for the machine learning algorithm. For example, in finance, an expert might derive financial ratios from balance sheets and income statements, which are more indicative of a company's health than raw financial figures. While deep learning algorithms can create complex manipulation of the data, prior knowledge of proven new features can significantly reduce the training time of machine learning algorithms.

In summary, the beauty of traditional machine learning algorithms often lies in the simplicity of their model. Although deep learning algorithms are powerful techniques, their transparency and clarity are often lost in their “black-box” implementation. The former often aligns better with the needs for transparency, understandability, and regulatory compliance in a business context and thus emphasizes the need for feature engineering.

**Reference**:

Bengio, Y., Courville, A., & Vincent, P. (2013). Representation learning: A review and new perspectives. IEEE Transactions on Pattern Analysis and Machine Intelligence, 35(8), 1798-1828