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<div align="center">Use cases for TensorFlow</div>

TensorFlow is an open-source software library for machine learning, is used for training and inferencing neural networks. Since neural networks can be built for almost any kind of dataset, this review will encompass the different use cases for building a neural network using TensorFlow rather than another library, or if TensorFlow is used along with another library.

TensorFlow can be used for threat detection: whether they be cybersecurity attacks, or fraud detection. Threats have become a norm in modern day technology. The field of cybersecurity continues growing, as technology heightens and remains a threat to most people who have zero knowledge on how to protect their data. Threat detection is considered a task for cybersecurity engineers, while "normal" people rely on them for their computers or data to not be vulnerable. Threat detection heavily relies on training data to be able to *detect* an incoming attack. TensorFlow first classifies suspicious activity. For example, let's suggest that mouse clicks in a certain way let's us know pattern differences between regular users of a bank application, versus non-regular user. This is how group classification occurs. The other way TensorFlow is used for classification is distinct user behavior. Let's say a user is clicking certain areas, such as viewing account information that may lead to a pay with an SSN number. This could potentially detect an irregularity if the customer usually does not click on this page. The

latter type of classification is much more difficult to classify if a dataset is too small enough to train on very few users.

Voice and Sound Recognition is one of the most common areas for using TensorFlow. For example, if we think of a voice recognition software such as Alexa or Siri, we can probably emulate them by using TensorFlow. We can also use sentiment analysis for voice recognition scenarios. TensorFlow Lite is used to run Machine Learning on devices. In order to train the models, users can use Speech Commands Dataset. The dataset has 65,000 one-second long utterances of 30 short words, by thousands of different people,

Another interesting use case for TensorFlow is image recognition. Tensorflow can recognize objects with algorithms by classifying objects and identifying new objects based on previous learning. A great example is using image recognition in health care. A computer can scan different types of cancers and give a recommendation based on previous learning/scans. Another example is facial recognition, take Clear at the airport as an example. Clear detects a face based on a person's iris and detects who is traveling. Because Clear analyzes so many people, it can identify when a new person comes along.

Timeseries is a huge topic for TensorFlow. Providing statistics for a person and giving recommendations based on actions over time is something that ads, and recommendation systems use. Netflix recommends tv shows based on what a user watches and clicks on. Google ads targets items you or your friends might like to pop up. In the beginning of time of course, it is expected that the TensorFlow algorithm will

be weak in comparison to the most recent time, which shows how critical learning is for machine learning.

Related to voice recognition, translation is also a use case for TensorFlow. In order to translate, TensorFlow has language recognition. After recognition, an algorithm can also summarize a paragraph by using sequence to sequence learning.

In conclusion, TensorFlow is a useful library for many different areas of machine learning. It not only does useful algorithms for text data but also for image machine learning problems. The ability to aid threat and fraud detection is one of the greatest use cases in terms of cybersecurity in machine learning. Currently companies like Splunk are using Tensorflow for this area.

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