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# The Effect of Data Science on the Banking Industry

The banking industry is somewhat notorious for lagging behind in technological advancements. However, with its already large pool of consumer, employee, and security information the banking industry has not ignored the benefits that data science can provide to their institutions. Through its influence on financial institutions, data science has brought Natural Language Processing(NLP) technology, Computer Vision(CV), mobile app integration, and biometric recognition to the forefront of the banking industry.

Because the application of NLP algorithms are almost endless, it is no surprise that the technology has risen to prominence in almost all industries, including banking. The most widespread application of these algorithms is as advanced chatbots. For example, Bank of America launched an NLP powered chatbot which now has over 1 million users (Shroff 2019). This bot accepts both text and voice commands from users by use of their smartphone. The popularity of these chatbots alone among customers proves the value that NLP has brought to the banking industry. Although NLP has greatly increased customer satisfaction, the success of the technology in customer interaction has allowed banks to shrink the size of their human customer support teams(Rijmenam 2018). This allows banks to further shrink their operating costs and thereby increase their profits: NLPs benefit both the client and the organization.

Another technology that has greatly influenced the banking industry is Computer Vision. Computer Vision is the application of Artificial Intelligence to the analysis of videos and

pictures. Common applications of this technology include facial and handwriting detection. Like NLPs, the general nature of CV algorithms range across industries, being used for everything from defense to retail. One use of CV is in customer verification. Customers are now able to submit selfies remotely to banks as a method of identification when setting up a bank account or performing a large withdrawal(Joshi 2019). This application of CV increases the convenience on customers' end, as it allows them to perform banking operations remotely. Without Computer Vision, using facial recognition as a method of customer verification would be impossible.

In addition to increasing the convenience of customer verification, the application of CV in finance is the performing of paper transactions digitally(Joshi 2019). An example of this is the remote cashing of checks via pictures/videos. This uses handwriting recognition in order to get necessary information such as the check amount, the reason for the transaction, and the signature of the person writing the check from its body. Furthermore, handwriting can also be used as an extra measure of security against check fraud. Take the signature recognition for example. This can be used to confirm that the person signing the check really is participating in the transaction, and is not being falsified. Computer Vision algorithms that are trained to recognize signatures are able to do so with success, thus making it viable for fraud detection. This application of CV in finance increases both the convenience for the customer, and the security of their transactions. This implementation allows banks to attract new customers, who may be attracted to the financial institution because of this convenience, and trust banks more because of this security.

Although CV has greatly increased the security of certain bank transactions, the collection and application of biometric data has had an arguably greater effect. The use of this type of data is only possible with the analysis capabilities of a neural network. Furthermore, because these indicators are unique to every individual, they are oftentimes better indicators of

identity than the traditional methods. An example of the use of biometric data to verify the identity of a customer is Wells Fargo's Eyeprint Authentication(Arthur, Frank 2019). Because of Wells Fargo's mobile app integration, they need a quick and easy way of identifying who is making the purchase from the customer's phone. This increase in convenience normally comes with a decrease in security. By using eye-scanning technology, however, banks are able to mitigate this aforementioned risk. Another application of biometric data being used for security is Citi Bank's voice authentication feature(Arthur, Frank 2019). This has a similar application as the previous technology, but instead of using eye-scanning technology, speech patterns are analyzed as a verification method. Both of these applications of biometric data are significant in that it shows the diversity of data which can be used as verification, thus making it difficult to hack these systems.

The most common deployment method for all of the aforementioned technologies in the banking industry is through their mobile apps. Because of the widespread use of mobile apps banks are able to use them to increase customer access to features that utilize Computer Vision and NLP(Rijmenam 2018). The desirability of these apps cause a large part of these banks' customer base to use them. This allows banks to use these apps as data collection methods, thus allowing them to personalize the banking experience for customers. Through this personalization, banks are also able to provide more secure transactions. This is done by segmenting the customer base into who is likely to spend what amount on goods based on their previous spending patterns and behavior. In a digital environment, banks are able to collect much more data than they normally would on a given customer(Ostapchenya 2021): since smartphones are part of almost every customer's activity, mobile apps which collect this data are invaluable to the organizations who use them.

Because of the sweeping changes brought in by data science and AI, many ethical questions have been raised. Namely, the replacement of workers with Artificial Intelligence, and the privacy concerns associated with the collection of data on customers necessary to do predictive analytics. This issue with the collection of data is one facing all industries: do companies sacrifice the privacy of their customers to increase their bottom line, or do they attempt to maintain some boundaries on what they decide to collect and use to make decisions. Factors such as race, gender, and education, though illegal to be included in algorithms, can be hidden in proxy variables and used to assess risk. The difference between receiving a loan and not getting one can depend on one of those factors. This in and of itself can be used to justify not using data science in any industry. However, the benefits brought by data science and predictive analytics are undeniable, and though they come with some ethical dilemmas, these might be avoided with stronger regulations and regulatory enforcement.

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