

EBOOK

Top 4 Growth Areas of Machine Learning in Telecommunications



INTRODUCTION

If there is one industry that should be leveraging data in every way possible, it's telecommunications. After all, it's through their services that billions of people each day are generating massive amounts of data on smartphones through calls, text messages, app downloads and every kind of internet activity imaginable.

No wonder, then, why an [analysis by ReportsnReports](#) in 2014 projected that the use of data analytics in telecommunications would grow nearly 30 percent per year between 2013-18. A report the following year, by Ericsson, went even higher, projecting a 50 percent compound annual growth rate by the end of 2019.

And yet, experts say that the telecom sector has only just begun to explore the potential of data science.

The McKinsey study found that most companies that invested in data science attributed the investment to a modest increase in profits, while a small number achieved major increases. But the good news is that calculating return on investment (ROI) for these types of investments in [data is becoming more concrete](#), and as it does, more and more businesses are willing to take the leap.

So while there is certainly debate within telecom companies about whether the return on investment is worthwhile, there is no doubt that data science, machine learning (ML), and artificial intelligence (AI) are inevitable when it comes to the industry's future. Those that figure out how to leverage these techniques and technologies will thrive; those that don't will be left behind.

The importance of data science, ML, and AI to the telecom industry will likely present itself in these four areas in particular, which this paper will take a look at individually:

1. Techniques in troubleshooting
2. Combating fraud
3. Marketing tactics
4. Customer experience improvements

A study by McKinsey, Telcos: The Untapped Promise of Big Data, based on a survey of leaders from 273 telecom organizations, found that most companies had not yet seriously leveraged the data at their disposal to increase profits. And only 30 percent say they have already made investments in big data.



TROUBLESHOOTING

PROVIDING - AND MAINTAINING - GOOD SERVICE

Obviously, one of the major challenges for telecom providers is being able to guarantee good service to subscribers. That means trying as much as possible to reduce dropped calls, poor sound quality, and the myriad of other issues that will make a customer throw their phone into the river or, worse, seek a new provider.

Analyzing call detail records (CDR) being generated by subscribers at any given moment of the day is key to troubleshooting. Yet CDRs are challenging to work with because the volume of data gets massive and unwieldy quickly - it can include the identity of the caller, the cell phone tower the call is coming from, the phone number of the recipient, the cell phone tower the recipient is receiving the call from, the time of the call, the duration of the call, etc.

The largest telcos collect up to 6 billion CDRs per day, so unless you plan on hiring every person on the planet, that's not data that a human workforce can analyze. Data science, ML, and AI (in tandem with [data science platforms or tools](#)), however, offer the opportunity to:

- Instantaneously parse through tens of millions of CDRs in real-time (instead of analyzing past data that no longer is relevant in up-to-the-minute troubleshooting).
- Identify patterns ([using advanced ML strategies like anomaly detection](#)) within the call volume that may point to problems that need to be addressed (such as dropped calls, long download times, and poor call quality).
- Create scalable data visualizations that also help identify these patterns and issues.
- [Leverage predictive maintenance](#) techniques to identify early issues likely to result in poor customer experience or down time before they cause more widespread problems.

Companies that fully harness the ML movement can conduct root-cause analysis in real-time to fix the problem more quickly and develop plans to avoid the issue from occurring again. But at the same time, that data can also be leveraged to allow investigation into why problems took place long after they occur by analyzing trillions of phone calls, all at scale.



COMBATING FRAUD

RISKY BUSINESS

For the telecom industry, fraud is always top-of-mind. The wireless revolution has opened up all kinds of opportunities for crooks that didn't exist back in the good old days of the landline, and telcos and their subscribers have struggled to keep up with the latest scams. [Verizon estimated](#) in 2014 that fraud costs the telecom industry upwards of \$4 billion a year, and that's not even accounting for the money lost by individual subscribers in phone scams.

Of course, there are the scams that nearly anybody with a cell phone is familiar with involve automated calls (some more convincing than other) aimed at getting an individual to reveal sensitive information that can be used to steal their identity, such as their credit card number or social security number. Such activities are rarely a direct threat to telecom companies, per se, but they do represent a long-term threat to customer satisfaction that these company obviously has an interest in addressing.

Another common trick that often ends up hurting both the customer and the company involves scammers leaving messages in the hopes of getting a person to call back, at which point the person is re-routed to a number that charges premium rates and asked to listen to a long message.

Another major problem for telcos is what is referred to as “first party fraud” or “true party fraud,” in which a person purchases phones or services without any intention of continuing to pay for them. They create “synthetic identities,” often by slightly altering otherwise accurate information about themselves, such as their social security number, email address or physical address to purchase multiple phones and service contracts, which they thereafter cancel and sell the phones on the black market, often overseas. In other situations, the scammer pays somebody else to sign up for multiple contracts at different stores, perhaps by convincing them that they are taking part in a “secret shopper” program to assess customer service. In either case, the telecom company is left with equipment that will never be paid for.

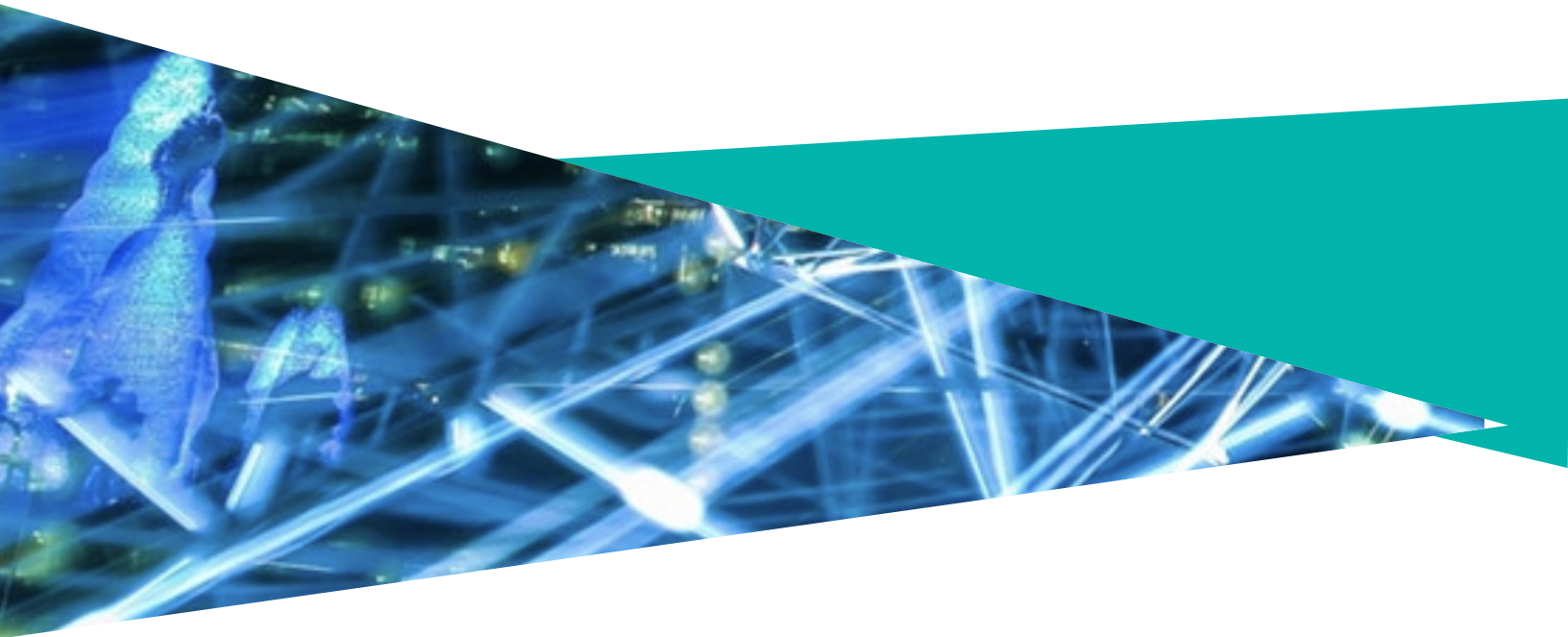


COMBATING FRAUD

CUTTING-EDGE TECHNIQUES

The more quickly that telecom companies can parse through large amounts of data, the better off they are in identifying suspicious call patterns that correlate with fraudulent activity.

Increasingly, fraudsters (and the telecom companies trying to stop them) are both battling with the help of high-level machine learning capabilities. Criminal networks are deploying sophisticated spoofing techniques to mask their locations and identities, forcing telcos to continue to up their data game in the form of more scalable - and thus more automated - processes that can bring meaning quickly to massive amounts of data.



Cutting-edge ML and AI strategies like [advanced anomaly detection](#) make it much easier for telcos to quickly identify “true party” fraud. Experian, the consumer credit reporting agency, has [developed an algorithm](#) that analyzes the information and behavior associated with a defaulted contract and assesses the probability that the default was the result of fraud.

Although it is very difficult to track down and hold fraudsters accountable, being able to distinguish legitimate credit defaults from fraud helps telcos understand which customers they can realistically expect to recover lost revenue from, and which ones have essentially vanished. With that knowledge, the companies can focus their collections efforts on the cases that are most likely to generate a positive return.



MARKETING

CHALLENGES

In few industries is market share as fluid as in telecommunications. Customers frequently switch operators based on a variety of factors: price, quality/availability of service in their area, the availability of desired products, and general perception of the brand.

The high churn rate in telecommunications, estimated at between 20-40 percent annually, is the greatest challenge for telcos. Even gaining a slight edge on competitors in terms of customer retention can mean significantly reduced costs and therefore, improved profits. Being able to perceive subtle shifts in the market empowers telecoms to identify strengths and weaknesses that may be affecting their performance vis-a-vis their competitors.

There is always room for improvement in terms of analyzing market dynamics. The more that data gathering and analysis can be automated, the more quickly and precisely it can be leveraged to support future growth. For instance, Infocepts, a firm that specializes in information analytics, described how it helped to re-engineer a major telecom market share application by automating a number of processes, including the process by which data was validated. The previous manual validation led to “reporting inconsistency.”



MARKETING

THE ULTIMATE "KNOW YOUR CUSTOMER" - PREDICTION

Just like companies in any other industry, telcos are harnessing data to build better profiles of customers, figure out how to best win their loyalty (in the most scalable and automated way, of course), and allocate marketing budget:

With improved data architecture, they are able to harvest and store a greater diversity of data that provide insights into each customer: demographics, location, devices used, frequency of purchases, usage patterns.

By leveraging data science tools and platforms, they are able to seamlessly combine this data with that from other sources (like social media data, for example) for an even better and more complete customer understanding.

Leveraging ML in more [advanced churn prediction](#) reveals not only who are the most likely churners, but taking it one step further, who are the likely churners that will also actually respond positively to marketing messaging ([known as uplift modeling](#)).

Doing marketing attribution using [machine learning](#) (as opposed to traditional heuristic methods) gives a more accurate picture of which channels are most responsible for customer conversions for better ad buying.

The more data that is available and the more sophisticated the data analysis tools, the more precisely telcos can segmentize customers and approach them with marketing messages and offerings that appeal more directly to their specific needs. This applies to existing customers as well as potential customers who could be lured away from a competing operator.



CUSTOMER EXPERIENCE

PROVIDING BETTER SERVICE, AT SCALE

There are countless ways in which more advanced data techniques like ML and AI can help telecom companies improve their standing with subscribers and increase customer loyalty. Some of them are unique to the telecom industry, but many are the same types of marketing and CRM strategies that virtually every major industry should embrace.

Machine learning can help companies easily and quickly - key for a scalable approach - identify customers who are most likely to buy additional services or be interested in new products. The most obvious example is targeting those who are about to hit their data limit and offer to upgrade them to a package that allows higher data use... but that's just the beginning.



More specifically, by analyzing data use patterns, companies can likely predict what a particular customer values from their service, such as downloading or streaming videos, playing games, browsing the internet or using a WiFi hotspot. With those insights, a telco can better-tailor its pitch to a subscriber by framing the prospect of greater data in a way that the subscriber is most likely to appreciate. "Want to watch unlimited Netflix? Stop paying overage fees! Sign up for unlimited data package for an extra \$14.99 a month."



CUSTOMER EXPERIENCE

MORE POSITIVE INTERACTIONS AT A LOWER COST

In the long term, telcos can enhance their services by analyzing the millions of customer complaints they get every year to figure out which types of improvements will have the greatest impact on customer satisfaction and thereby increase customer retention.

Telcos are also looking to enhanced data analysis as a way to reduce service calls. “Truck rolls,” as they are referred to in the industry, exact a heavy cost on operators. There are competing estimates of the average cost of a truck roll when considering the vehicle cost and labor; \$150 per service call is at the low end. Beyond the extra dollars spent, truck rolls also impose heavy opportunity costs by diverting technicians from other work that could yield greater long-term profits. As any seasoned technician can attest, many truck rolls are the result of an issue that does not require on-site expertise, such as a cable that is not plugged in.

The more that telcos can analyze data on customer calls, the more they can begin to recognize which types of problems are most likely to lead to unwarranted truck rolls and put in place measures to prevent those calls. Given the number of calls and the depth of analysis required, this necessarily dictates a ML approach - more specifically, a deep learning approach. Because analyzing the calls themselves means dealing with lots of unstructured data, it’s the perfect place to expand into ML and deep learning for big gains.

Telcos can also leverage data at a larger and more automated scale to gain insights into the performance of their technicians. For instance, it should not be difficult to get access to critical performance data, such as: How often after a service visit from a particular technician does a customer call lead to another call in the next 30 days?

When there are significant differences in the number of follow-up calls between technicians, that usually says something about the quality of the service the technician is providing. Whether what is needed is additional training or simply a warning to an underperforming technician, the result will be better customer experience and reduced costs for the company.



THE HOW

Given that most telecommunication companies have not yet seriously leveraged all the data at their disposal using the most cutting-edge ML and AI techniques to increase profits, that means those businesses that do jump at the opportunity to leverage these technologies have the potential for big gain.

But if the potential for gain, both in terms of reduced costs and increased revenue, is so big, then why aren't more enterprises executing on this already?

The answer is because this transformation requires a coordinated change not just in technology platforms and tools, but in processes and - most difficult of all - in people. Using data to its fullest potential means truly putting it at the core of the business, not just in the hands of a few or of one siloed, central data team. Everyone - from individual contributors to executives, marketing teams to engineers to customer service, and everyone in between - should have access to the data relevant to their role and know how to use it to drive everyday decisions and processes.

If you're ready to dive in to transformation at scale, see how people in other enterprises have successfully executed - for example, take it from [Andrea Gallego](#), Principal & CTO at BCG Gamma, who explains how to use an approach that is driven less by technology and more by people for long-lasting impact of analytics within the enterprise.

CONCLUSION

AT THE BRINK OF INDUSTRY TRANSFORMATION

Data science is already a big part of the telecommunications industry and it is only poised to grow in importance as big data tools become more sophisticated and are able to assess and parts of the business that were long thought to be beyond the realm of predictive analytics.

What is unmistakable is that the companies that succeed in the coming years will be those that figure out how to best exploit the massive number of data points that are flowing both through their network and around it to reduce labor costs, develop better technology and, above all else, to better-understand what the 7 billion potential customers around the world want to do with their phones and computers.



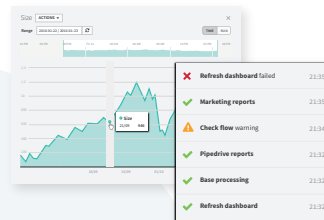
Your Path to Enterprise AI

Clean & Wrangle

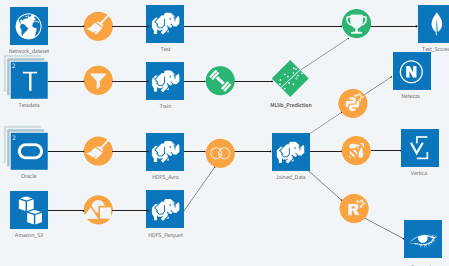
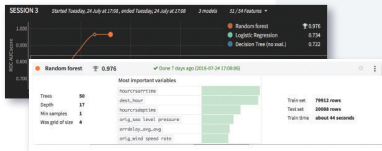
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Brown, Mr. Owen Harris	male	22
Moran, Mr. James	male	35
Haskins,		26
Javala, M.		35
Allen, Mr. Y.		35
McCarthy,		
Hewlett, M.		29

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- Keep only rows containing Mr.
- Split column on Mr.
- Replace Mr. by
- Remove rows equal to Moran, Mr. James
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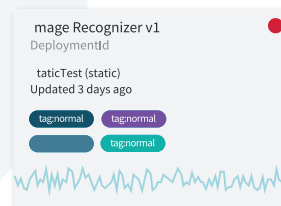
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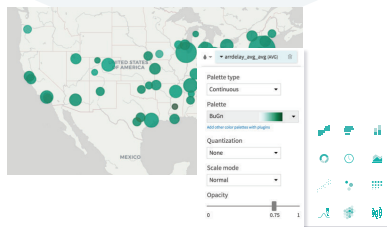
Build + Apply Machine Learning



Deploy to production



Mining & Visualization



400+
CUSTOMERS

40,000+
ACTIVE USERS*

*data scientists, analysts, engineers, & more

Dataiku is one of the world's leading AI and machine learning platforms, supporting agility in organizations' data efforts via collaborative, elastic, and responsible AI, all at enterprise scale. Hundreds of companies use Dataiku to underpin their essential business operations and ensure they stay relevant in a changing world.



