How Artificial Intelligence is Transforming Automotive Industry Monetization Models

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Summary

Artificial intelligence and machine learning are creating huge possibilities for reading and analyzing data from vehicles. Bright Box uses AI and machine learning to provide next-level solutions for business tools and user interaction.

The purpose of this report is to examine how the very latest trends in IT — artificial intelligence (AI), machine learning, and big data analytics — can help in the search for the right monetization models in a changing car market and increase value for customers. We will rely on two examples of each monetization model (service model, industrial analysis and planning, and forecasting) in order to provide more practical insight into how to reduce costs and monetize collected data using AI.

This report will be of use to commercial departments such as sales, marketing research, and product marketing. The information it contains will help you calculate cost reductions and evaluate the utilization of collected data.
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Introduction

Regarding by expert’s prediction the number of IoT devices in the ecosystem is expected to reach more than 20 billion units by 2020. IHS Markit projects 30.7 billion IoT devices for 2020, and Gartner expects 20.8 billion by that time (excluding smartphones, tablets, and computers). IDC anticipates 28.1 billion (again, not counting those devices).*

At the same time, according to IHS Automotive there will be 152 million connected cars on the world’s roads by 2020.** Most car manufacturers are either in the process of launching or already have launched their own connected vehicle platform.

A consequence of this process is the accumulation of a massive quantity of data from connected vehicles and connected drivers.

Telematics devices produce data containing information such as date, time, speed, acceleration, deceleration, cumulative mileage, fuel consumption, and navigation. Approximately 6-20 megabytes of data is collected annually per car.

The total data is thus over a terabyte per year for 100,000 vehicles. This crucial data can be used by many stakeholders to increase their revenue streams. This data is expected to increase further due to the growing adoption of connected cars during the forecast period.

The ascension of the connected car brings new opportunities for manufacturers and dealerships, enabling companies to use artificial intelligence and machine learning to increase value for their customers. It’s time to change how the automotive industry sells products, services, parts, and accessories, including the re-purchasing of new cars based on driver behavior.

Obtaining real knowledge about how cars are used can also optimize dealership offerings for end customers without having to waste time “hypothesizing” about their needs. AI-based solutions give us the opportunity to make personalized offers to the right person at the right time.


What is Artificial Intelligence?

When it comes to processing this data, the most efficient approach is to use machine learning algorithms. These algorithms help form behavioral patterns for certain driver profiles and then offer car owners exactly what they need both in the car and through their mobile phones via a corresponding application. They accomplish this by remembering their behavior and analyzing their driving history and the situation on the road.

What is AI? The most basic method uses manually written rules. These are custom rules that represent a flow of events and corresponding actions triggered by rules. The second method involves creating associative rules. This is one of the most common approaches. Let’s assume that a car owner often purchases new tires when visiting a dealership for planned service. This helps us create a rule that IF the driver comes in for service, he or she will buy new tires as well.

Bright Box builds a driver profile by combining telematics data such as position, fuel level, etc. and enrich this data with additional details from the driver’s history and third party services. As a result, we get the following information: position, fuel level – low, expected ride duration – long, distance to nearest gas station – short, etc. Once this is done we initiate the rule-generation algorithm, and it generates a rule: if the expected ride duration is long, the fuel level is low, and there is a gas station nearby, we suggest filling up the tank. But this leads to an additional question: how do we avoid spamming the driver for no reason? He or she might actually be on their way to a gas station at that moment. Rule generation can be made more complex. In general, this is called “conceptual learning”, and it has different levels: conjunctive concept, conjunctive concept plus internal disjunction, Horn disjunctions, and first-order logic. We will then be able to generate decision trees. Each subsequent method will be more powerful and more calculation-intensive than the last.

What is the process of self-learning? We have the classification, and according to the previous insights, we issue a label for each tag. Then we immediately use the training section with reinforcement, and the algorithm provides recommendations based on the user’s reaction and improves their behavior.

Watch the video how to empower your business with AI
How AI is Applicable to Telematics (and Other) Data?

Artificial Intelligence and machine learning are creating huge possibilities for reading and analyzing data from various sources. Remoto uses these types of technologies to provide next-level solutions in business tools and user interaction.

Remoto AI is based on our experience creating the Remoto Connected Car Platform, which obtains data from hundreds of thousands of connected drivers. All the information collected from every vehicle – trips, telemetry, engine RPMs, speeding up and slowing down, accidents, etc. – should be used to make people’s lives easier, including users and industry professionals.

That’s why we use artificial intelligence and machine learning to create recommendations for customers based on their incoming telematics data. AI data processing helps attract insurance companies and parking and car-sharing services – companies that know how to monetize data – to the ecosystem.

We should probably mention that we’ve been on the market for 5+ years. Every connected car unit generates up to 8.7 million records. That’s an average of over 2.3 million car status entries or about 70 terabytes of raw binary data.

Remoto AI can evaluate the customer’s lifestyle and recommend accessories, and it can also sell cars based on driving style and the individual’s lifestyle. Moreover, it can predict when the user needs to go in for service based on data generated from the telematic control unit or OBD dongle. The new system is based on work that Bright Box has done in processing 1.5 terabytes of data from connected car users from various countries.

This is why we’ve created Data Lake on the basis of Microsoft Azure, where terabytes of data gathered from cars are stored in a structured fashion. Upsell forecasts are based on the data from telematics (mileage, GPS, speed, RPMs), as well as from CRM, DMS, or ERP systems (customer ID, transaction date, breakdowns by work/materials). It can bring

**AI-based clusterization algorithm helps to choose the right accessories (pic. 1)**

<table>
<thead>
<tr>
<th>Telematics</th>
<th>Cluster 1</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving style: time of day, recurring, inter-city</td>
<td>People who are often driving at night and seldom driving in peak time.</td>
<td>• offer new tires adopted for that</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>User Profile</th>
<th>Cluster 2</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociological: Age, Gender, Region</td>
<td>People who are frequently using the trunk and the right rear door.</td>
<td>• offer cargo hook</td>
</tr>
</tbody>
</table>

| Vehicle Profile | |
|-----------------| Make, Model, Year, Modification |
so-called «insights» to light based on this data. For example, we can calculate approximately 100 indicators that we consider important: the portion of driving time spent at speeds of over 80 mph, how frequently the driver steps on the gas, where they go most frequently in an urban or rural setting, etc. Data is constantly being accumulated and analyzed from all available sources. We have a certain number of indicators that characterize each unique user. These include the total driving time during a given period, the amount of time spent at certain speeds, the amount of time during which the right rear passenger door was open/closed, the amount of time spent within a certain range (5-10 miles), the total number of trips during a given period, how long the trunk was open/closed overall, the amount of time spent driving in the morning (6:00-11:00 AM), and 120+ more insights.

We can then determine the likelihood of a response to an offer from a dealer based on every driver’s indicators. If this probability reaches a certain value required to trigger a marketing or service campaign, a push notification is sent to the user’s email or smartphone. The car owner receives a minimally-interactive message. If the customer is interested, Remoto AI offers to send them an application, open a chat window, or schedule a return call from a dealer for further communication. The customer’s reaction affects the evaluation of the probability of their responding to similar offers in the future (pic. 3).

The AI learns from all the data that has been collected. It works based on the driver’s behavior, as well as on the “lookalike” principle, which is extremely accurate.

Bright Box’s AI-based solution makes it possible to offer drivers from various categories a certain set of products and services, including appropriate accessories, new car sales, or an upcoming service visit.
How Artificial Intelligence is transforming automotive industry monetization models

Since we’re in touch with customers, we’ve come to realize over the years that OEMs need to increase new car sales when consumer preferences change, optimize operational costs, and improve customers’ comfort, convenience, and confidence in vehicle ownership through a simple turnkey solution.

Cars have traditionally been purely mechanical and not designed to provide digital solutions. OEMs used to invest in improving the quality of their engines and chassis and focus on improving safety and power increase. However, the growth of internet technologies and the results that have been achieved in the fields of AI, machine learning, and big data analytics are transforming the auto industry. With these technologies, OEMs are improving the driving experience, meeting customer expectations, and positioning themselves to take advantage of new monetization models.

The traditional players (OEMs and dealerships) now have to share market opportunities with IT players. Thanks to smart assistants, IoT devices, and CRM-based customer lifecycle management systems, brands can now be much more present in a consumer’s life. As a result, equipment manufacturers need to start thinking about new ways to communicate and provide value inside and outside the car.

The automotive industry is collecting more and more data about their customers, but targeting in marketing is based almost exclusively on online data, not the data being gathered by connected cars. All the information collected from every vehicle – trips, telemetry, engine RPMs, speeding up and slowing down, accidents, etc. – needs to be used to make people’s lives easier, including users and auto industry professionals.

The automobile development cycle is long enough for AI, big data analysis, and machine learning to enrich the product-planning process. Data collection and analysis provides clear direction about the nature of customers and their needs as consumers.

These solutions can be monetized through the sale of services, accessories, and vehicles.
AI can tell when it’s a good time for a driver to replace their car, understand that their lifestyle has evolved, and offer them a new car pre-customized to meet their needs.

By using AI we can analyze and predict drivers’ consumer behavior (what they like to do, how they like to use their cars) and, most importantly, understand their future needs and what kind of car or accessory they’re going to need tomorrow if their lifestyle changes. For example, if a driver has a baby, we need to offer them a somewhat larger car.

In addition, AI and machine learning will allow OEMs to control planning features in the car (buttons, displays, and indicators). Big data and big data analysis can provide concrete information about the natures of customers and their needs regarding specific functions – something that has always been a challenge for OEMs. AI-based industrial analysis and forecasting allows OEMs to add or remove certain features and functional buttons today, identify defective component suppliers, and, of course, reduce costs.

Remoto AI dashboard (pic. 4)
NSC Business Cases

Big data analysis and AI-based algorithms help national sales companies forecast customer behavior. Collecting data from connected cars, internal production systems, and AI can speed up business processes and decision-making time for car manufacturers. This technology will help NSCs choose the right solutions and strategies in the fields of product marketing, sales, and after-sales services by automating communication with customers and changing their lifestyle and perception of their vehicle.

While everyone is focused on functionality, the real value of smart, connected technology may be data. NSCs currently have very little visibility into how their cars are being used. They don’t know how their customers drive or what features of their vehicle they’re using. While privacy will be an issue, a connected vehicle can easily produce behavioral data on how to make the driving experience better for customers in the future.

Data will also be more directly connected to the bottom line. Research today indicates that automaker profits will drop as technology vendors grab a bigger piece of the pie. Brands need to consider how data can be harnessed to create new value propositions for consumers and business partners. For example, how can new in-car entertainment system serve as a marketing research tool that drives both product development insights and community marketing programs?

While you might think that doing these things would involve a top-down reorganization of brand efforts, innovation often works best when companies start small and then scale up. Marketing teams can begin building consumer-centric communication models now and gradually expand into other touch-points as data rolls in. The opportunities that arise moving forward will probably be unexpected, but brands need to start setting the stage for change today.

In 2017, car owners are moving away from aspiration to utility, and the brands that want to win need to focus on the services a car can provide. Customers are slowly defining their expectations for the connected car experience, and the emerging leaders will be those that identify and meet these expectations first.

If you understand what your audience needs, you can change your marketing strategy and reach out to them based on your knowledge of consumer behavior.
IHS Automotive predicts that about 30 terabytes of data would be collected each day from the 152 million connected cars on the road in 2020.* Using aggregated data to preserve customer privacy, machine learning algorithms can identify driver behavior patterns, which enables dealerships to offer services that uniquely meet a customer’s specific needs long after the vehicle has been purchased.

Providing connected car services brings manufacturers a higher marginal return compared to selling cars as standalone products. Machine learning algorithms and AI make it possible to sell each separate service efficiently to each user, thereby increasing revenue. More importantly, a car equipped with connected services isn’t just a product, but a continuous channel of communication between the dealerships and the customer.

AI can overcome primary obstacles and increase parts sales. It can also improve parts and accessory sales by providing customers with personalized services such as targeted offers and loyalty programs to increase conversion rates of offers, utilization of dealer service departments, and interactions with dealership.

You can discover new business opportunities by monetizing real-time vehicle data for third-party consumption or creating new value-add services for customers. For example, you could facilitate smart insurance by offering insurance companies pre-authorized access to client data to enable pay-as-you-go and pay-as-you-drive insurance offerings. Alternatively, you could deliver new in-app services such as mobile payments to simplify transactions for dealer services or add-on roadside assistance services.

The main measurable business indicator for the dealer is the number of customers involved. Any dealership can see the effectiveness of an IT system in machine arrivals. The effectiveness of a given technology can be calculated by the number of machine runs there are before and after the introduction of the system. You can also count how many customers are left after six months compared to how it was three years ago. This is a service that can bring car manufacturers more margin than car sales. Let’s take a look at an example involving five dealerships:

![Table](http://news.ihsmarkit.com/press-release/country-industry-forecasting/big-data-drivers-seat-connected-car-technological-advance)

As you can see from the chart above, if 10-15% of customers return for their next maintenance appointment, this is considered a success.

Machine learning algorithms and AI technology make it possible to effectively sell each individual service to a particular customer, thereby increasing revenue. However, when switching to a service model, it is important to competently manage information about a given car owner and correctly approach the cost of services for that customer.

Typical project overview

When implementing an AI solution, it’s important to understand that every such system is based on data. If there’s no data, there’s no AI. And if we’re talking about using artificial intelligence in connected cars, it becomes obvious that we first have to have a connected car platform that we can build upon. It’s also vital to combine this data with data gathered from transactional systems (ERP, CRM, DMS). These data sets enrich and complement each other, making it possible to find many more insights and draw more valuable conclusions about a given driver’s behavior.

Another important element of implementing an AI solution is the availability of computing power. Any type of data processing is similar to Bitcoin mining in that you need to have enough power to work with AI.

Finally, you need a team of data scientists with a proven track record of performing data forecasting and programming neural networks. Classic approaches don’t work for processing this kind of data. You need to use new approaches that are currently trending in the AI software industry. To do this, you need to be sure that the team working on your project has the necessary expertise, or you’ll face the risk of spending too much time learning new technologies. The team must have people with expertise in the following technologies:

- Docker (containerizing; hosted on Ubuntu amd64)
- Python 2 (main programming language)
- Storage of intermediate results in cPickle
- C++ (a module for fast Avro reading)
- webpack, babel (build systems)
- chartist, leaflet (for map and chart visualization - Remoto clients)
- SCSS (for applying styles)

People expect a lot from AI nowadays, but, formally speaking, these expectations do not rest on successful business cases. That’s why it’s very important (especially during the implementation-planning stage) to assume that a project can produce real value only if it has a set of small goals defined for a particular time period. The key to success is to set small goals and reach them. The first thing you need to do is achieve high accuracy in forecasting mileage and dealership visits. Next you need to develop a recommendation system that sells accessories only, then service, then new cars, then analyzes the most frequently used car options. It is imperative to build the process step by step and not attempt to make a big AI system all at once.

As you have already realized, we have a lot of data from the car, and we have a lot of data from the owner of the smartphone. Artificial intelligence, which we also offer for the car, gives you recommendations. For example, we already know that you have a meeting tomorrow morning because we accessed your calendar, and we also know that your gas level is not enough. With AI we will send a notification to your smartphone saying «please leave half an hour early because you need to get gas».

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