



# HOW MACHINE LEARNING HELPS SALES SUCCESS

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Machine Learning labels a new wave of enterprise software which is able to learn from data and make predictions, explanations, detect anomalies, make recommendations and many more. We explain how CRM can leverage Machine Learning and allow sales and customer satisfaction targets to be reached more efficiently.



# NEW WAVE OF ENTERPRISE SOFTWARE

Whether we like it or not, someday machines will do things better than men. While it is a spectacular topic, this is not going to be yet another sci-fi outlook kind of article. It is going to be a practical one. We might not recognize this yet, but in many fields, the machine-based advisory has already become "business as usual".

The financial industry for instance already leverages so-called robo-advisors, which employ algorithms such as modern portfolio theory that originally served the traditional advisory community<sup>1</sup>. In most cases, it does not (yet) completely exclude humans and therefore it is often called "hybrid robo-advisory". A study of MyPrivateBanking for instance estimates that hybrid robo-services will grow to a size of USD 3,700 billion assets worldwide by 2020; by 2025 the total market size will further increase to USD 16,300 billion<sup>2</sup>.

Well, let us take sales in general. Many will say that there is little structure in selling, that it is more about psychology, and that it is an art. That's true and this will remain true for some time, therefore we will have to stay in the field of hybrid advisory here as well. Where we hope to gain the support for sales processes in general however, is Microsoft Azure Machine Learning (hereinafter - ML). We will look and see how its combination with Microsoft Dynamics CRM 2016 can help achieve better sales now.

## WHAT IS MACHINE LEARNING?

Machine Learning is about enabling computers to recognize patterns in existing data and generate code that will make predictions on new data. The code being generated can then be used in other applications. Machine Learning has a strong scientific foundation, which includes studies of pattern recognition, mathematical optimization, computational learning theory, self-optimizing, and nature-inspired algorithms, and others.

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1. livemint "Robo advisory could change distribution"  
2. My private banking "Hybrid Robos will Manage 10% of Investable Assets by 2025"

Machine Learning can make predictions and help make better decisions in many situations, such as:

- Discovering structures
- Finding unusual data points
- Predicting values
- Predicting categories
- Solving varying problems

and some others.

### AZURE MACHINE LEARNING

Microsoft has created a Machine Learning service, put it into its cloud platform (Azure), and made it available from anywhere in the world. The platform is very scalable and can work with large amounts of data. The prediction models can be built with Azure Machine Learning Studio, which is accessible at <https://studio.azureml.net>. The models will be deployed as web services which will be accessible from a general Azure dashboard. Those web services can then be utilized by external applications such as Microsoft Dynamics CRM.

### ML-ASSISTANTS

According to multiple sources, the average number of decisions an adult makes each day is about 35,000. There are not any reliable statistics about salespeople specifically, but if we start counting, we will find that hundreds of decisions need to be made on a single sales opportunity. In addition, there can be multitudes of potential deals in the sales pipeline at the same time. That means this is one of the most decision-intensive jobs and the result (a successful sale) depends directly on the quality of those decisions. Experience is a teacher here for sure and there is nothing more valuable than an experienced salesperson. Having all the sales experience of the company at someone's disposal was something unreachable until now. Machine Learning will help make this possible. Let us look at how it can be done.

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Sales process is very decision-intensive

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**HOW I DO CLASSIFY THIS ACCOUNT?**

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**WHAT IS A BEST SALES TACTIC HERE?**

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**IS THIS CUSTOMER SATISFIED?**

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**WHAT SHALL I DO NEXT?**

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**WHAT WOULD BE THE BEST PROPOSAL HERE?**

Here are some typical examples of situations in which a salesperson needs to make a decision:

- Account classification
- Best sales tactics identification
- Individual proposal identification
- Cross-sales identification
- Operational assistance
- Customer satisfaction recognition
- Revenue optimization in a customer class
- Complexity analysis of a deal

The quality of decisions depends very much on the knowledge and experience that the salesperson has collected. In order to make a decision, he will recognize the patterns (in many cases intuitively, or by "fast" brain System-1 in terms of the famous book, "Thinking, Fast and Slow" by Daniel Kahneman<sup>3</sup>) and make predictions which are based on his experience - his previous learnings. Sounds familiar to how machine learning works, right? So, why not support the salesperson with suggestions based on predictions the machine may make? Its value will be based on all of the sales information available in the company. In some cases, this even includes information that is, for whatever reason, restricted to a particular salesperson. Another (yes, arguable, but again, it's not about replacing the salesperson yet) value point here - the predictions will be rational, math-based, and free of any emotions that a salesperson may have.



### THE MACHINE AND THE SALESPERSON LEARN FROM EACH OTHER

The more accurate data we have for learning, the better the quality of the model being created will be. Overall, this is a two-way learning process. The machine will learn from the salesperson (from data that salespeople will enter into the system) and the salesperson will learn from machine (on predictions it makes).

At the very beginning, both the machine and the salesperson may be inexperienced and will make non-optimal decisions. However, it is important that the machine will be trained repeatedly on new data being generated. This leads to the following learning cycle.

3. WorldCat "Thinking, fast and slow"

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LEARNING CYCLE



As of now, a human needs to initiate the Best Model identification step seeing as a correct learning objective definition and model quality evaluation will be best done by a human, making them essential here. This may change in the future as well, with the newest inventions going on in this area.

With time and more accurate data/experience being available, the quality of decision-making will improve on both sides. This way the machine will become especially valuable for new salespeople joining, since they may not yet have experience with the products, customers, sales process, etc.

## EXAMPLE - BEST SALES TACTICS IDENTIFICATION MODEL

Let us approach one of the models, the tactics identification model, and see how it can be set up.

When it comes to sales, a company normally defines its sales strategy and how this strategy will be supported on tactical and operational levels. If the sales strategy is quite generic in its definition, when it comes to sales tactics, a one-size-fits-all approach is normally not the most efficient one. For a particular potential deal, an optimal sales tactic needs to be selected from all available options.

Let us take, for example, B2B sales in the IT Security industry. Imagine a company selling both antivirus and complex IT security solutions. On a strategic level the company may define its products, the market (for example, a geographical region), the type and size of clients, and the sales channels. On a tactical level - it depends. Is it enough to provide the customer with online self-service or do we need to discuss his/her needs in detail? What should be the level of contact persons we need to speak with? For instance, as shown in the table below, we might redirect the customer to self-service or involve the sales force, depending on the customer's size and the products being sold.

A ONE-SIZE-FITS-ALL SALES TACTIC IS NOT THE MOST EFFICIENT

BUSINESS SIZE	PRODUCT	SALES TACTIC
SMALL	PC ANTIVIRUS IT SECURITY	SELF-SERVICES SALES FORCE
.....		
LARGE	PC ANTIVIRUS IT SECURITY	SELF-SERVICES SALES FORCE

There can be many more possible factors that may affect our decision on sales tactics. The nice thing about Azure Machine Learning is - it will help us identify those factors as part of the data preparation stage. We will feed all of our sales data into the ML-platform and then we will be able to identify and exclude any part of it which does not influence the tactics selection. There may be some surprises regarding what the proper prediction will depend on.

From the opposite side of things, some dependencies will really make no sense at all and the non-relevant information may need to be excluded by domain experts at this stage.

In the end, we may come up with a list of factors that influence our decision on sales tactics like the one below, which will then be used during the ML-cycle:

- Customer business size
- Customer industry
- Deal size
- Product group
- Repurchase or new deal

The history data needed for model generation will then look similar to this one:

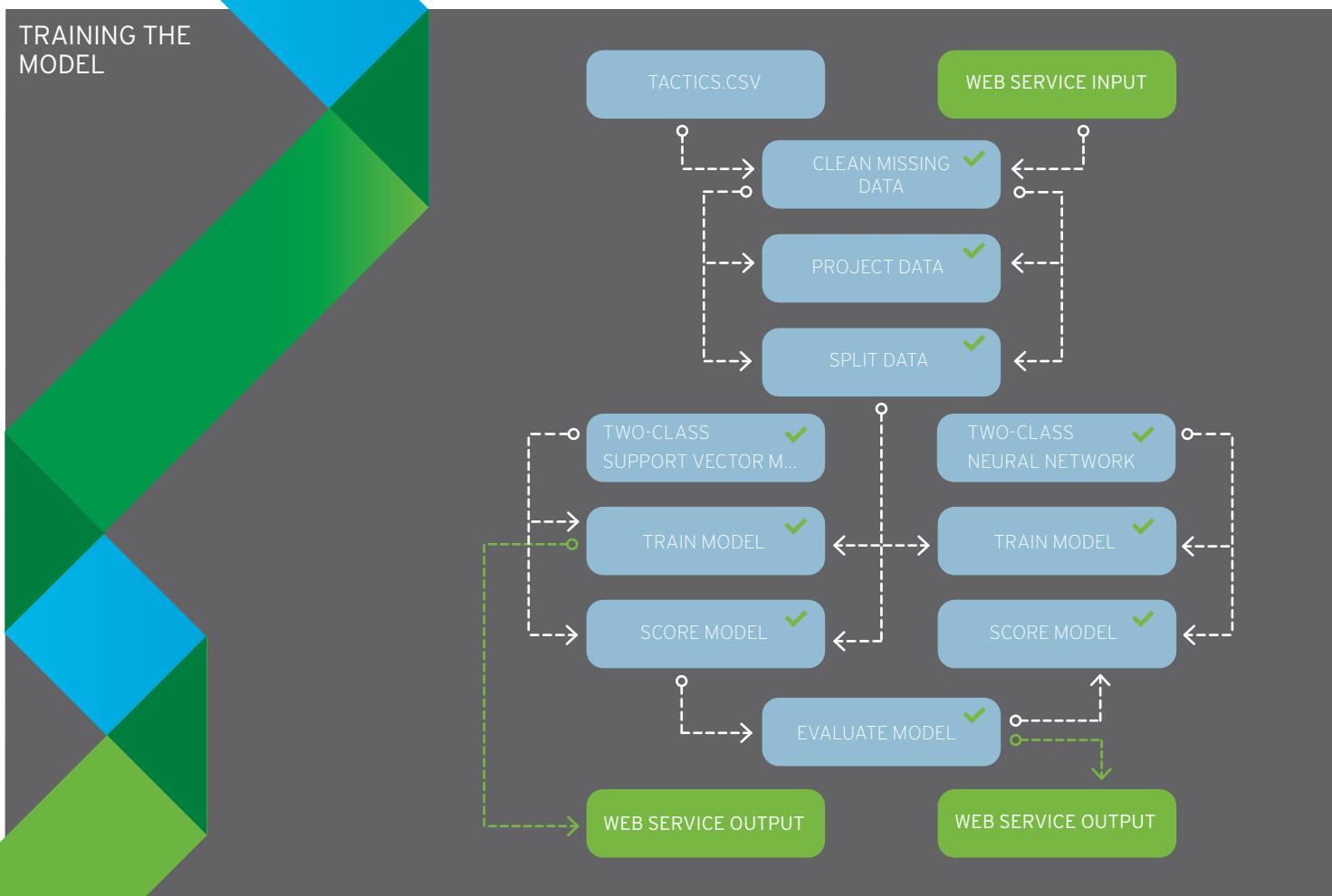
### HOW WE MIGHT REDIRECT THE CUSTOMER

BUSINESS SIZE	ACCOUNT INDUSTRY	DEAL SIZE, TD. \$	PRODUCT TYPE	REPURCHASE	SALES TYPE	WON
LARGE	IT-SERVICES	100	NO	A	SALES TYPE	NO
SMALL	CONSUMER GOODS	50	NO	A	SALES TYPE	YES
LARGE	COMMUNICATIONS	20	NO	A	SALES TYPE	NO
SMALL	IT-SERVICES	10	NO	A	SALES TYPE	YES
LARGE	BANKS	100	NO	B	SALES TYPE	YES
SMALL	IT-SERVICES	75	NO	B	SALES TYPE	YES
LARGE	IT-SERVICES	50	YES	B	SALES TYPE	YES
SMALL	COMMUNICATIONS	10	NO	B	SALES TYPE	YES
LARGE	BANKS	250	NO	A	SALES TYPE	NO
SMALL	IT-SERVICES	1	NO	A	SALES TYPE	YES

4. Microsoft Azure "Machine learning algorithm cheat sheet for Microsoft Azure Machine Learning Studio"

## MODEL GENERATION AND DEPLOYMENT

We will use Azure ML Studio for our model generation. Internet Explorer alone can be used to access it and use all of its features. First of all, a dataset for learning will be needed. In our example we will extract our sales data from the CRM system as a csv-file (there will be many more data source formats supported). This will be one UI-item on the design surface of ML Studio. Here we may add additional predefined learning UI-items and connect them to a learning sequence as shown in the picture below.



As the picture shows, we will:

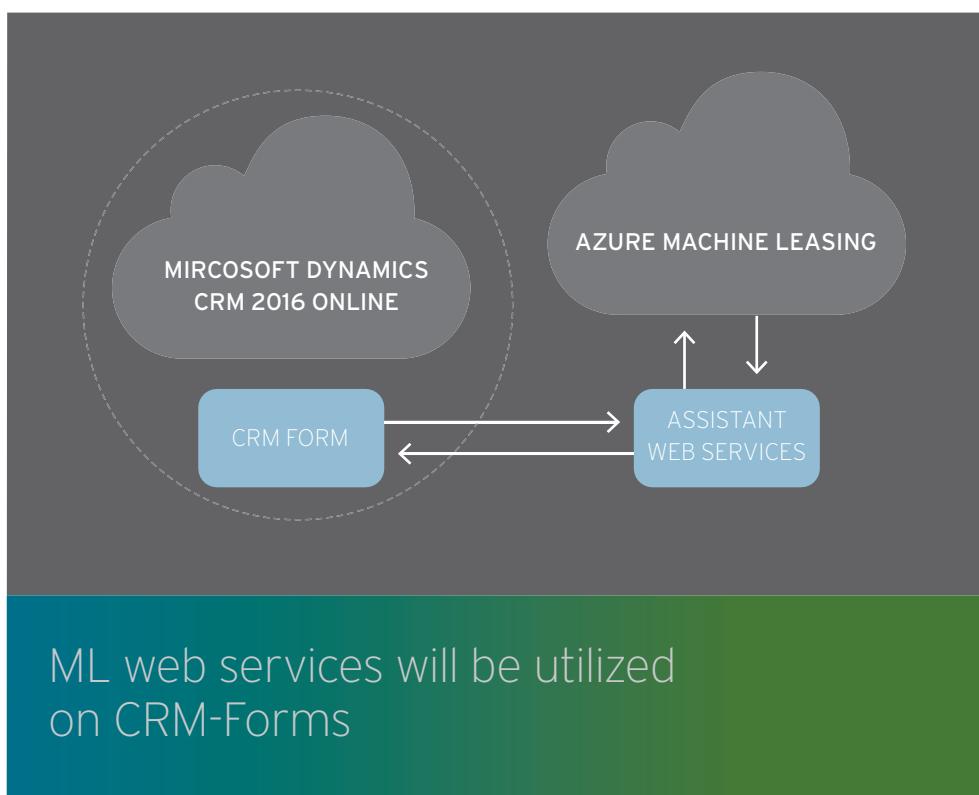
- Clean up the data - missing data will not allow trustworthy predictions
- Project columns - non-relevant data will be excluded
- Split data - a part of the data (normally 80%) will be used for pattern recognition and model training, and another part for model evaluation
- Apply a particular algorithm for training the model
- Score the model and, finally, evaluate the model

Azure ML comes with a large number of machine learning algorithms. We have used a multiclass neural network algorithm which gives a pretty good prediction in this case, but generally, for a particular class of problems one type of algorithm may suit the need better than another. Before entering the trial and error process, learning the Azure ML Algorithm Cheat Sheet<sup>4</sup> may be helpful. During the evaluation, the accuracy of the computed outputs will be examined. If a certain prediction success is reached (for example, the prediction is correct for 80-90% of test data), then we are good to go. Otherwise, the training cycle will be repeated. For instance, the cycle will repeat using another prediction algorithm or other algorithm parameters.

Finally, the model will be deployed in Azure as a web service. The web service will be placed on the Azure web service dashboard and can be further configured.

### INTEGRATION TO CRM

After a Model is deployed, a web service will be available (REST API) which can be directly communicated from the CRM system. This web service can then be utilized by the CRM system. CRM systems send data relevant to a particular record (for example, an opportunity which is being opened by the user) and the Azure web service sends back the evaluation results produced by the model. There can be different implementation options for Assistants from the user interface perspective.



One option will be to create web resources with logic in JavaScript that will implement communication to Azure ML web services and notify users. Those web resources will be placed on forms of entities – account, opportunity, quote, and others. A button can also be placed on the web resource that will activate an action within the context of ML-Assistant's suggestion. In the picture below, an ML-Assistant is implemented on opportunity form and it suggests changing the business process flow (i.e., sales tactics) because it is having lower winning expectation than alternative one. The activation of a “sounds good” button in this case will result in changing the business process flow to an alternative one.

## GENERALIZATION AND FURTHER IMPLEMENTATION SCENARIOS

After looking at all these scenarios, someone might say, all these sales models, data gathering, learning process... they are too specific. Do we need always to start from scratch for every process? Do we need to select data to be collected and provided for further analysis, collect it

(some data is not directly available and needs to be pre-processed), create and evaluate the model... for every new process? Well yes, even though Azure ML makes things much easier than before, we still have many challenges on leveraging ML. Those topics will be approached for sure as well. What we can do, for instance, is build frameworks that manage process metadata and make data gathering and pre-processing much easier.

It should be possible to map a certain sales methodology to a CRM sales model (configured and stored as sales process metadata in CRM) that would gather the needed sales information and provide it to ML-service for evaluation.

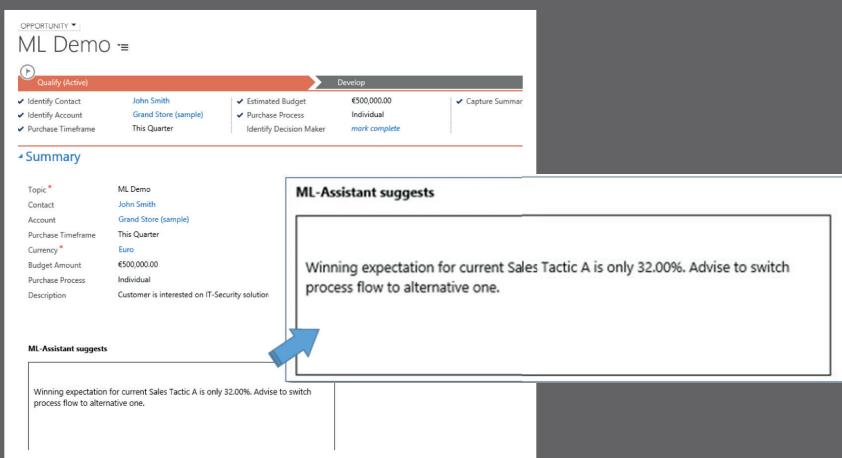
Next, the library of typical sales process models and corresponding standard, generic ML-services can be created that would even exclude the learning stage.

For instance following functionality can be included into those frameworks:

- Sales process metadata management
- Sales process data capturing and pre-processing
- Standard process templates
- Dynamics CRM - Azure ML integration components
- Predefined generic Azure ML Service APIs

There can be also other forms of ML-Assistant implementation like Cortana-based assistance or a generation of specific activities in the system and many more. Those topics are beyond the scope of the current article.

## ML-ASSISTANT ON OPPORTUNITY FORM



A professional photograph of a man and a woman in an office setting. The man, wearing glasses and a striped shirt, is leaning forward with a smile, looking towards the woman. The woman, dressed in a dark suit, is seen from the side, facing away from the camera. They appear to be in a modern office environment with large windows in the background.

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