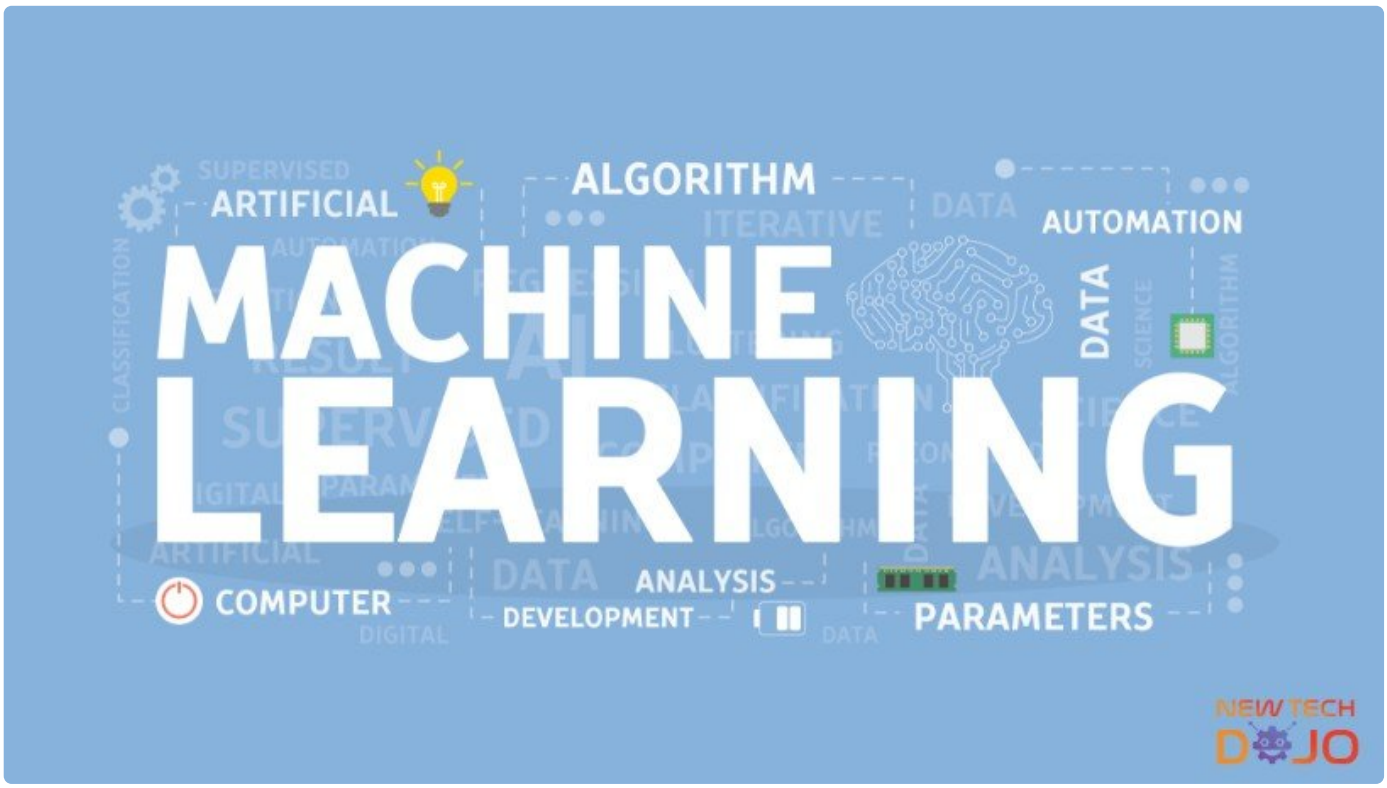
List of Machine Learning Algorithms

March 6, 2018 NewTechDojo (https://www.newtechdojo.com/author/admin/)
Machine Learning (https://www.newtechdojo.com/category/machine-learning/)



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Machine Learning Algorithms:

There is a distinct list of Machine Learning Algorithms. The method of how and when you should be using them. By learning about the List of Machine Learning Algorithm you learn furthermore about AI and designing Machine Learning System.

The Machine Learning Algorithm list includes:

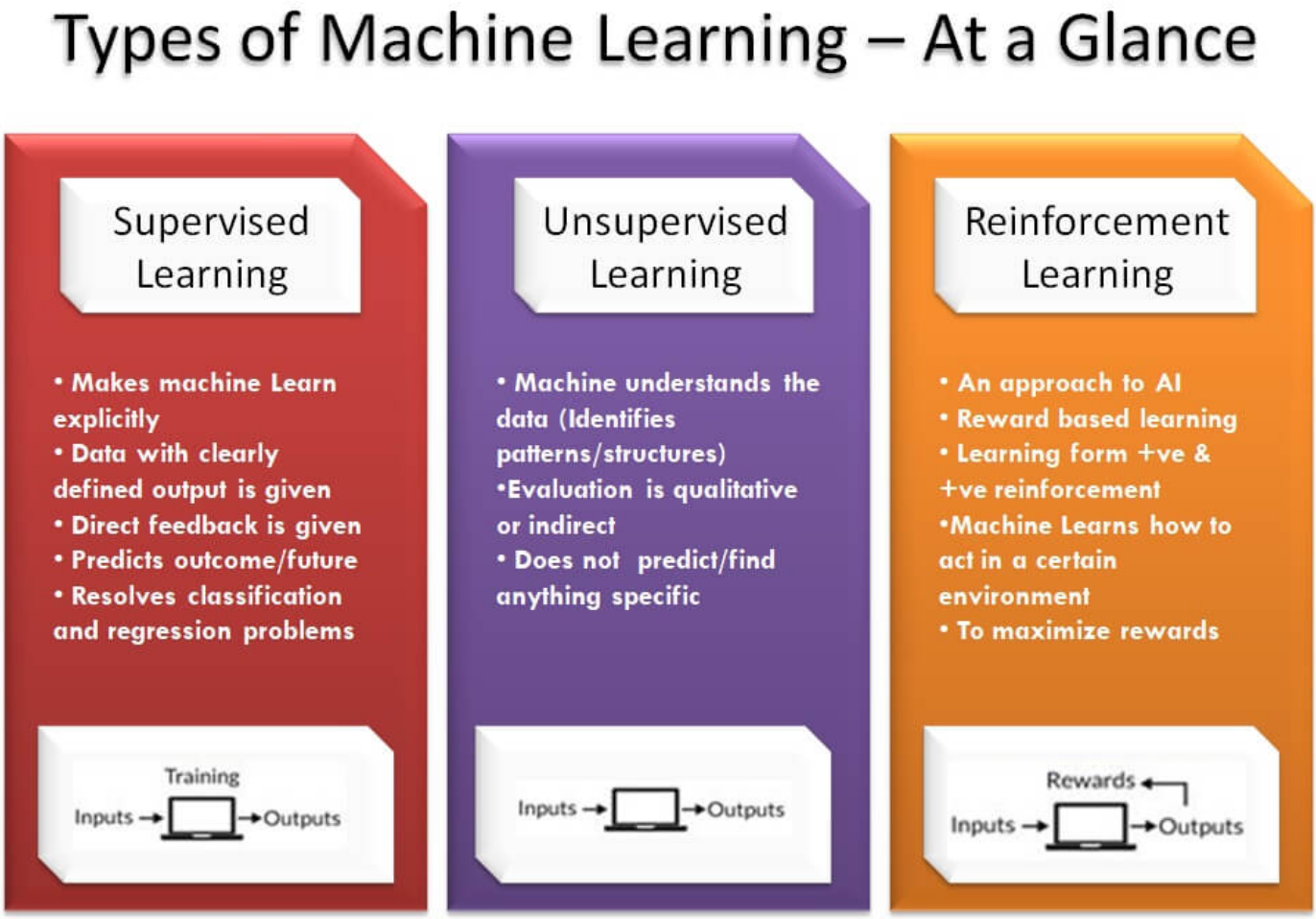
1. Linear Regression
2. Logistic Regression
3. Support Vector Machines
4. Random Forest
5. Naïve Bayes Classification
6. Ordinary Least Square Regression
7. K-means
8. Ensemble Methods
9. Apriori Algorithm
10. Principal Component Analysis
11. Singular Value Decomposition
12. Reinforcement or Semi-Supervised Machine Learning
13. Independent Component Analysis

These are the most important Algorithms in Machine Learning. If you are aware of these Algorithms then you can use them well to apply in almost any Data Problem. Data Scientists and the Machine Learning Enthusiasts use these Algorithms for creating various Functional Machine Learning Projects. Then comes the 3 types of Machine Learning Technique or Category which are used in these Machine Learning Algorithms.

The three categories of these Machine Learning algorithms are:

1. **Supervised Learning**
2. **Unsupervised Learning**
3. **Reinforcement Learning**

To understand it better, you would need to understand each algorithm which will let you pick the right one which will match your Problem and Learning Requirement.



Supervised Learning

The supervised Learning method is used by maximum Machine Learning Users. There is a basic Fundamental on why it is called Supervised Learning. It is called Supervised Learning because the way an Algorithm's Learning Process is done, it is a training DataSet. And while using Training dataset, the process can be thought of as a teacher Supervising the Learning Process. The correct answer is known and stored in the system already. The algorithm helps in making Predictions about the Data that is in Training Process and gets the correction done by the Teacher itself. There is an end to the learning only when the Algorithm has achieved an acceptable degree or level of Performance.

There are two types of Supervised learning problems. These Supervised problems can be further grouped into regression and classification problems.

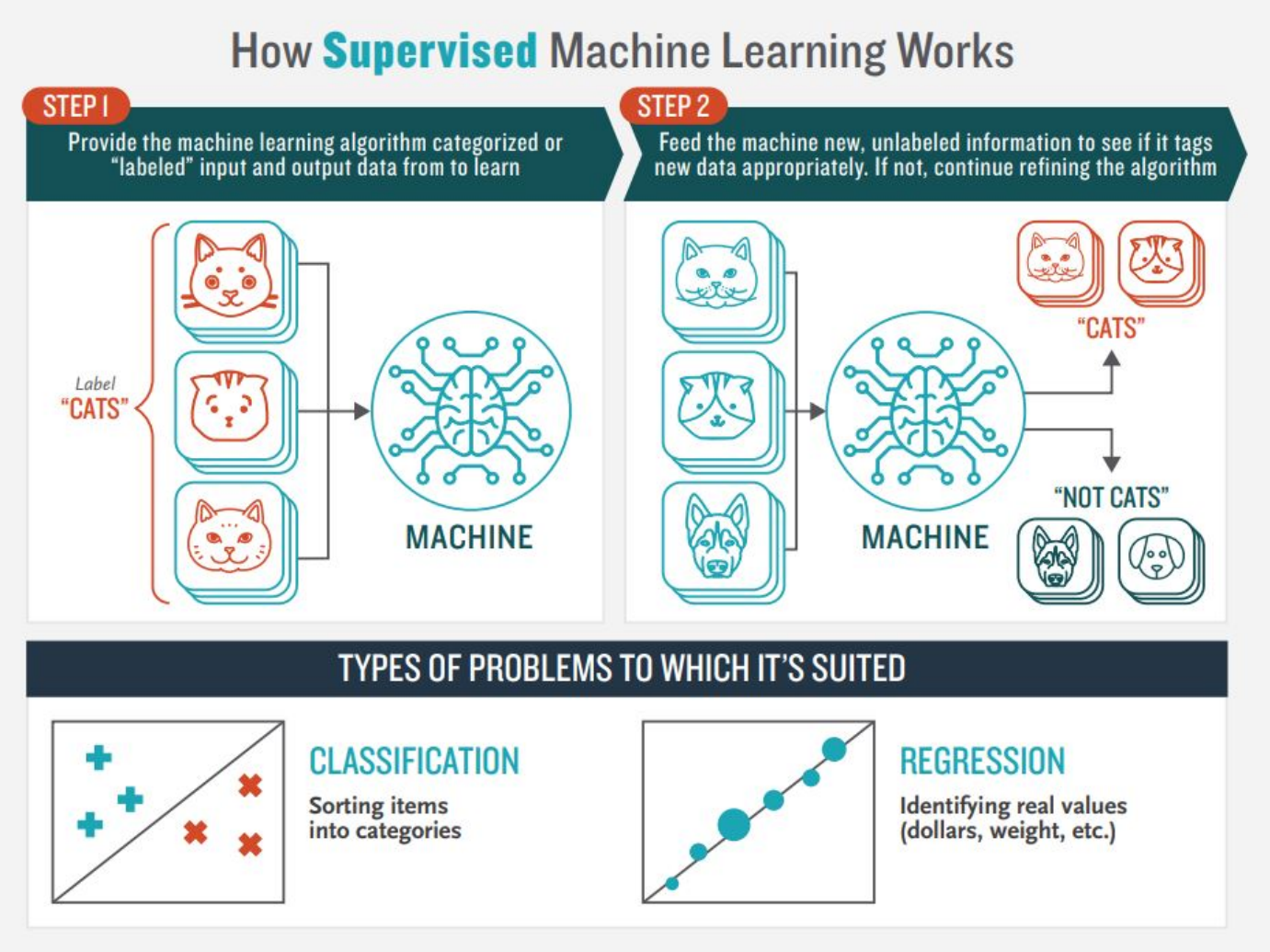
- **Classification Problems:** Classification problem can be defined as the problem that brings output variable which falls just in particular categories, such as the "red" or "blue" or it could be "disease" and "no disease".
- **Regression**: A regression problem is when the output variable is a real value, such as "dollars" or it could be "weight".

There are some problems which you get to observe in the Data Type. The common problems which occur or gets built on the head of the Classification Problems and the Regression Problem. The common Problems include the Time-series Prediction and Recommendation respectively.

There are few really Popular supervised machine learning algorithms, such as:

1. Decision Trees
2. Naive Bayes Classification
3. Support vector machines for classification problems
4. Random forest for classification and regression problems
5. Linear regression for regression problems
6. Ordinary Least Squares Regression

7. Logistic Regression
8. Ensemble Methods



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Decision Trees

Well, a lot is noticeable when you read the name Decision Tree, in simple terms a decision tree lends you the **help to make a decision about the data item**. For instance, in case, if you are a banker you get to take the decision whether you should give a loan to a person or not on the basis of his age, occupation and education level. You can do this by using a decision tree. While considering any decision tree, *we have to start the process from the root node and go on answering*

a particular question at each node and take the branch that corresponds to the particular answer. Well, following this mannerism, we traverse from the root node then to a leaf and then form conclusions in context to the data item. Let us consider an example based on a decision tree below.

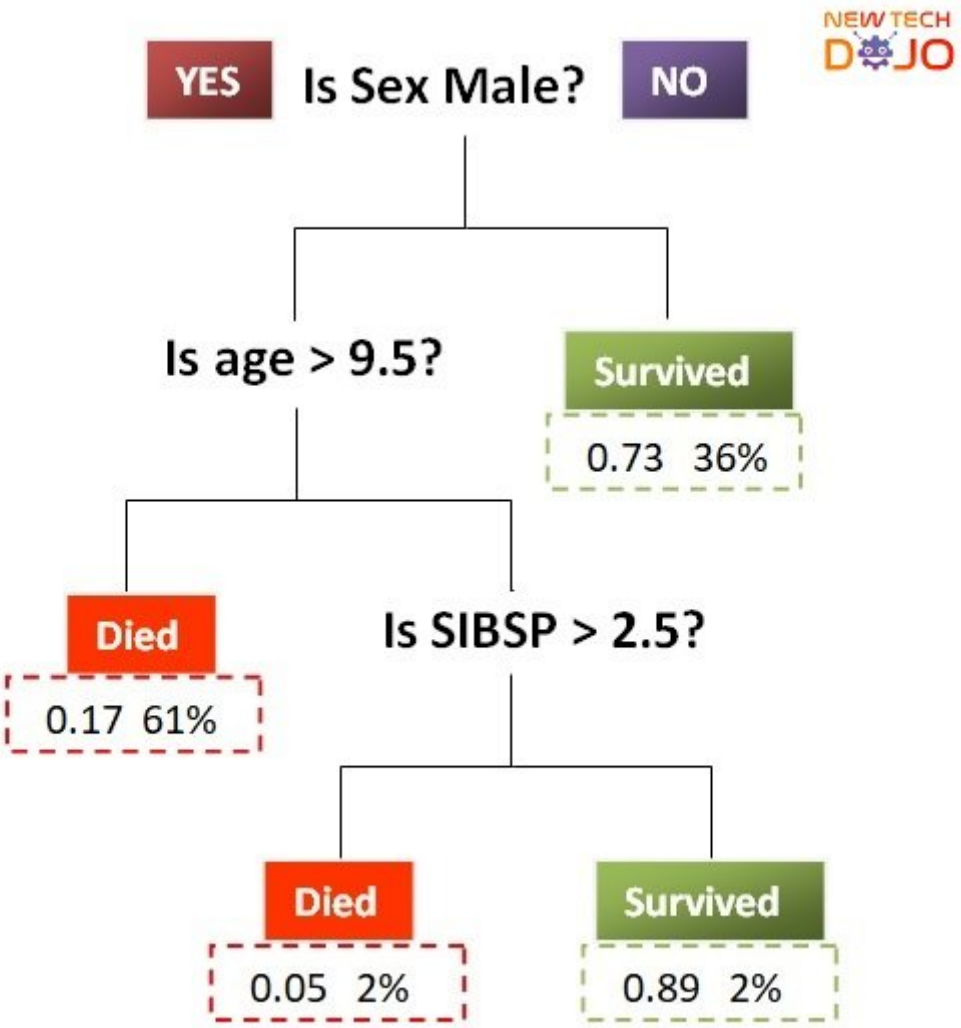

Fig: *A tree showing the survival of passengers on the Titanic ("SIBSP" is the number of spouses or siblings aboard). (Source: Wikipedia (http://wikipedia.org)).*

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Naive Bayes Classification

Heard about the Bayes' Theorem (https://en.wikipedia.org/wiki/Bayes%27_theorem)? So this is a classification technique dependent on the Bayes' Theorem. This is based on the Assumption which has independence amongst the Predictors. In simple terms, this could be put up as Naive Bayes Classifier which assumes that a particular feature in a class is not exactly directly related to any other feature.

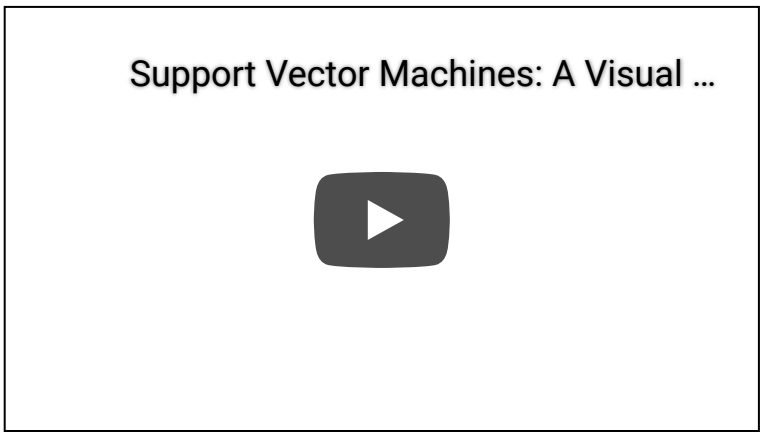
Considering the example, a Fruit can be considered an apple only based on its color i.e. if the color is red if it is round in shape and if it is about 3 inches in terms of diameter. Even if these features are interdependent and each of the features exist

because of the other feature. All these properties got to contribute independently to the probability of the outcome of Fruit that it is an apple and the reason being it would be Naive.

Naive Bayes model isn't difficult to build and is really useful for very large datasets. Along with simplicity, Naive Bayes is also considered to have outperformed all the highly sophisticated classification methods.

Support vector machines for classification problems (SVM)

Support Vector Machine is proved to be a supervised machine learning method. This is considered to be used in solving both regression and the classification problems. Generally, Support Vector is used as a classifier so that we can discuss SVM as how it is a classifier. Well, like other machines it doesn't have gears, valves, or different electronic parts nevertheless; it does what it can with normal machines to do: it takes the input, does the manipulation of the input and then provides the output.



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To be apt, in a given labeled training data SVM outputs, it applies an optimal hyperplane. This later helps in categorizing new examples.

Random forest for classification and regression problems

You have probably already guessed the answer having learned about decision trees. Yes, just the way a forest is a collection of trees, a random forest is also a collection of decision trees. Decision trees (https://www.newtechdojo.com/learn-decision-tree-algorithm-using-excel/) that are grown very deep often indulge in overfitting the training data so they can show high variation even on a small change in an input data.

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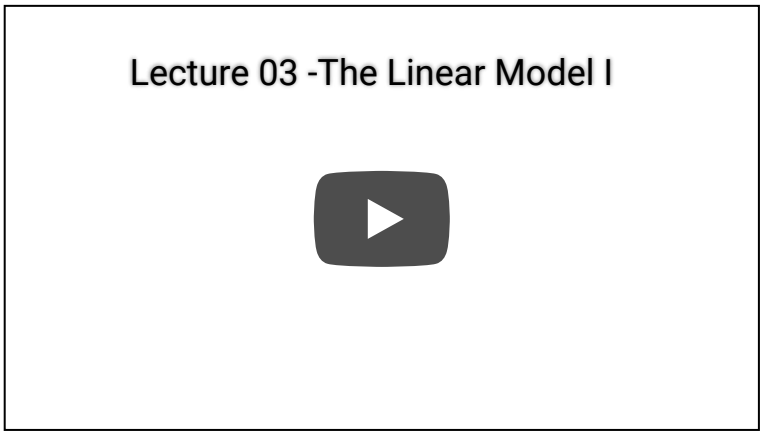
They are always sensitive to the specific data on which they can be trained so that they can remain error-prone to test data sets. The random forest algorithm helps to grow many such decision trees and provide the average of the different classification trees (or the mode). This reduces the variance. The different classification trees are trained on the basis of different parts of the training dataset. In order to classify a new object from an input vector, put the input vector down,

with each of the trees in the forest. Each tree gives a classification, the forest then chooses the classification of having the most votes or the average of all the trees in the forest.

Linear regression for regression problems

As the name indicates this already, linear regression is well known to be an approach for modeling the relationship that lies in between a dependent variable 'y' and another or more independent variables that are denoted as 'x' and expressed in a linear form. The word Linear indicates that the dependent variable is directly proportional to the independent variables. There are other things that are to be kept in mind.



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It has to be constant as if x is increased/decreased then Y also changes linearly. Mathematically the relationship is based and expressed in the simplest form as: This is

$$y = Ax + B$$

Here A and B are considered to be the constant factors. The goal hidden behind the Supervised learning using linear regression is to find the exact value of the Constants 'A' and 'B' with the help of the data sets. Then these values, i.e. the value of the Constants will be helpful in predicting the values of 'y' in the future for any values of 'x'. Now, the cases where there is a single and independent variable it is termed as simple linear regression, while if there is the chance of more than one independent variable, then this process is called multiple linear regression.

Ordinary Least Squares Regression

The Ordinary Least Squares Regression or call it ordinary least squares (OLS). The linear least squares. When we consider the statistics, this is a method where we estimate the unknown parameters. This is known as the linear regression model, it comes with the goal which minimizes the differences of the observed responses in some arbitrary dataset.

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