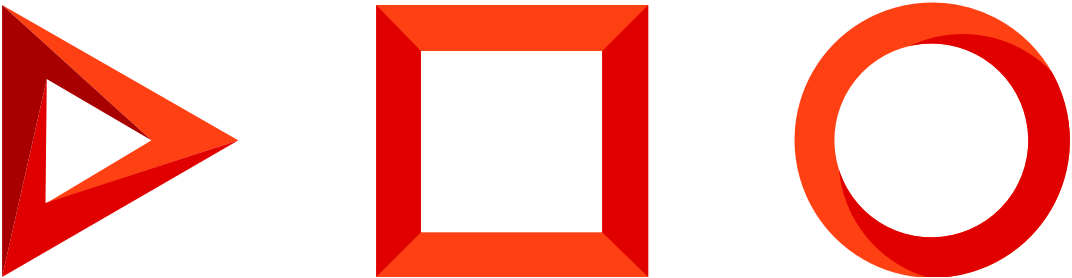


AI tools

Version 7.17



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Table of Contents

Predictive data analysis	4
Creatio machine learning model types	4
The ML model selection flowchart	5
Prediction setup procedure	6
Lookup value prediction model	7
1. Add a new recommendation prediction model	7
2. Set up the model parameters	8
3. Add the advanced settings	10
Prediction results	11
Numeric field value prediction	12
1. Add a new recommendation prediction model	12
2. Set up the model parameters	13
3. Add the advanced settings	15
Prediction result	16
Predictive scoring	16
1. Add a new recommendation prediction model	17
2. Set up the model parameters	17
3. Add the advanced settings	20
Prediction result	21
Recommendation prediction	21
1. Add a new recommendation prediction model	22
2. Set up the model parameters	24
3. Add the advanced settings	26
Prediction result	27
Similar text search	28
1. Add a new recommendation prediction model	29
2. Set up the model parameters	29
3. Add the advanced settings	32
Prediction result	32
Train prediction models	33
Implement prediction models	34
Implement the lookup value prediction	34
Implement the recommendation prediction	36

Predictive data analysis

PRODUCTS: **ALL CREATIO PRODUCTS**

This article covers the basics of working with predictive data analysis in Creatio.

The **predictive analysis** estimates the likelihood of specific events based on large volumes of historic data and current facts. It increases the speed and accuracy of business decisions, relieves the users from routine tasks, and improves overall efficiency and performance.

Predictive analysis in Creatio is implemented via a set of algorithms – machine learning models. Create, train, and use your custom machine learning models to predict values for any business object in the [*ML models*] section.

Attention. Using predictive analysis in Creatio on-site requires additional preliminary setup. Learn more: [Machine learning service](#).

Creatio machine learning model types

Creatio includes the following ML model types:

- **Lookup value prediction** (classification) – populates lookup fields based on the analysis of existing data and trends. For example, predict the most likely account category.
- **Numeric prediction** (regression) – populates numeric fields. For example, predict the lead budget based on the customer need type and the customer's company size, country, and industry.
- **Predictive scoring** – grades Creatio records based on historical and current data. For example, rate the quality of your leads based on their budget and successful hand-off to sales.
- **Recommendation** – predicts which Creatio records will interest customers the most. For example, find out which products or services you should recommend to a customer based on their previous activity. Alternatively, recommend any other Creatio objects to any Creatio subjects.
- **Similar text search** – creates lists of similar records based on the analysis of unstructured text data. For example, find relevant knowledge base articles or replies based on case text.

Find the available AI solutions for Creatio products on Fig. 1.

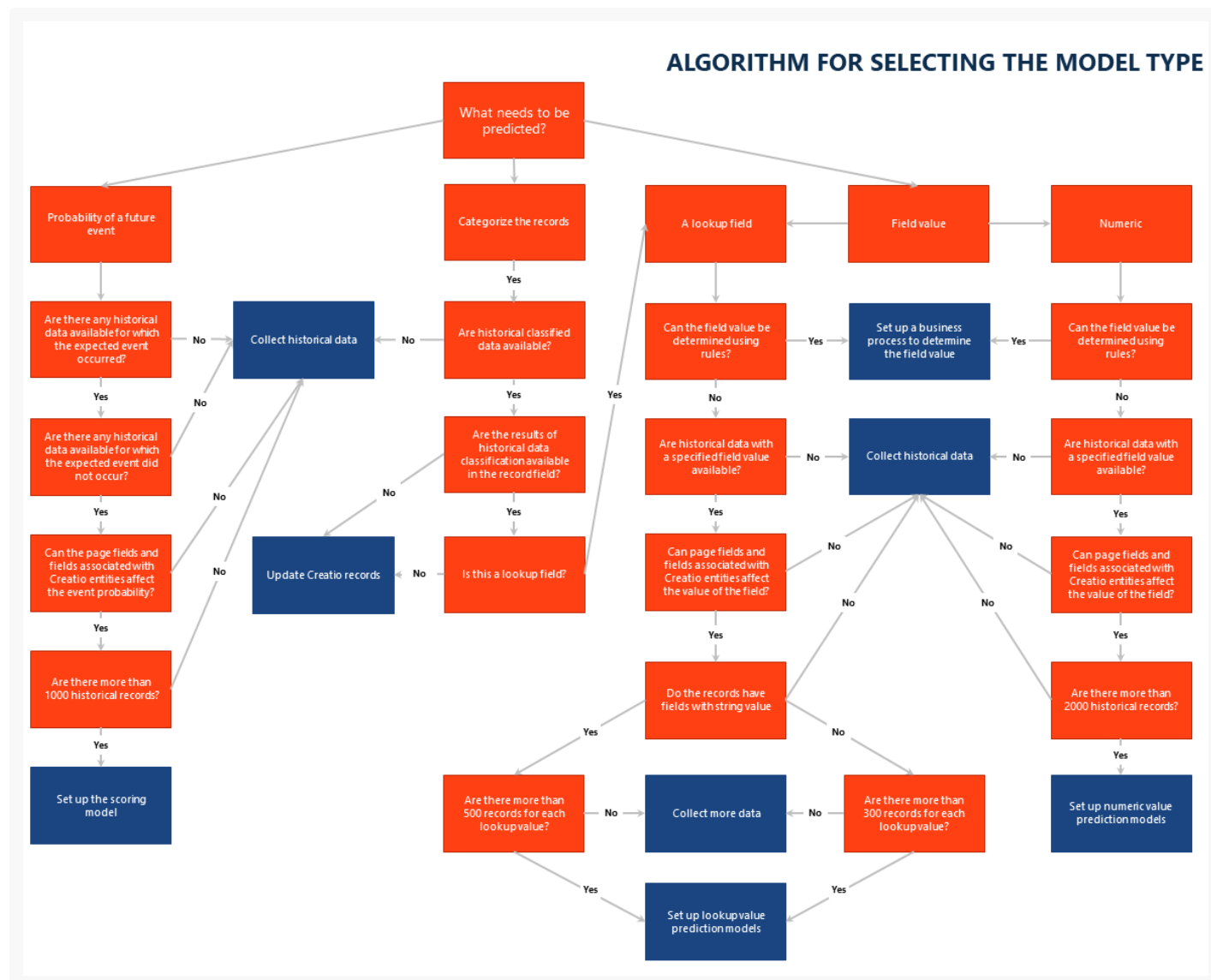
Fig. 1 The available AI solutions

MODEL	SALES	SERVICE	MARKETING	STUDIO
Lookup value prediction (classification)				
Case service prediction		V		
Case priority prediction		V		
Assignee group prediction		V		
Customer segment prediction	V	V	V	V
Classification of incoming emails	V	V	V	V
Analysis of email/case disposition	V	V	V	V
Intent prediction	V	V	V	V
Case module prediction		V		
Prediction of the best bulk email timeframe			V	
Predictive scoring				
Opportunity scoring	V			
Lead scoring	V			
Probability of the opportunity moving to the next pipeline stage	V			
Probability of customer churn	V		V	
Probability of failure to meet the case deadline		V		
Probability of invoice payment in due time	V			
Probability of a marketing campaign success			V	
Numeric field value prediction (regression)				
Opportunity amount forecast	V			
Case resolution cost forecast		V		
Total cost forecast (for example, for real estate)	V			
Case resolution period forecast		V		
Opportunity closing date forecast	V			
Bulk email response forecast			V	
Opportunity amount forecast	V			
Campaign duration forecast			V	
Recommendation system				
Recommending products to customer	V		V	V
Products for cross sales	V	V	V	
Recommending best next steps	V	V	V	V

The ML model selection flowchart

Use the flowchart below (Fig. 2) to select a prediction model type.

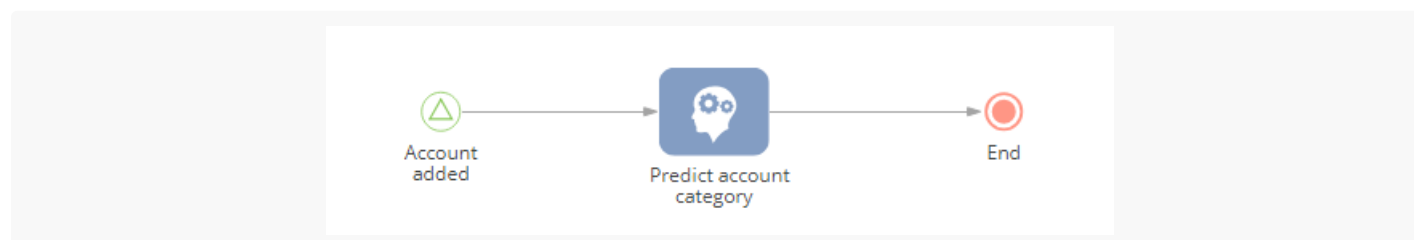
Fig. 2 Selection flowchart for the model type



Prediction setup procedure

Creatio gives you complete control over which records are predicted and when. After creating and training a new prediction model, use the [*Predict data*] process element to add machine learning to your new or existing business processes (Fig. 3).

Fig. 3 The [*Predict data*] element in a business process



Note. We do not recommend running predictive scoring for a large number of records simultaneously. The best solution is running the operation for each separate record, e. g., when adding or modifying the

record. We recommend launching the batch prediction when the use of Creatio is at its minimum, such as at night.

Lookup value prediction model

PRODUCTS: [ALL CREATIO PRODUCTS](#)

Creatio provides tools to create and set up machine learning models that predict the lookup field values. The predictions are based on the data available in the record and the previously processed records. For example, you can create a model that will predict the customer account category. [Case service and assignee group prediction](#) with such an ML model is available in Creatio out-of-the-box.

Note. Read more about the ML models and their business use in the [Artificial intelligence and machine learning in Creatio](#) e-learning course.

To create a lookup predictions model:

1. Set up and train a new ML lookup prediction model.
2. Set up a [business process](#) with the [*Data prediction*] element.

Attention. Using predictive analysis in Creatio on-site requires additional preliminary setup. Read more: [Machine Learning service](#).

1. Add a new recommendation prediction model

Example. Set up a machine learning model that will predict account categories in the [*Accounts*] section based on the industry, annual revenue, and number of employees.

To do this, set up and train a lookup prediction model.

To add a new ML lookup prediction model:

1. Open the [*ML models*] section in the [*Studio*] workplace.
2. Click [*New*] → [*Lookup prediction*].
3. Fill out the ML model creation mini page (Fig. 1):
 - a. [*Name*] - the name of the prediction model. The name helps to identify the model in the [*ML models*] section list and select it when configuring the [*Data prediction*] business process element.
 - b. [*Type*] - the ML model type. For example, "Lookup prediction." Creatio populates the field automatically when you select the model in the previous step.
 - c. [*Object*] - the prediction model will predict the records of this object (a section, a detail or a lookup). For example, "Account."

Fig. 1 The lookup value prediction model mini page

4. Click [*Next*] to save the mini page and open the lookup prediction model setup page.

2. Set up the model parameters

After you fill out the model fields, specify the parameters:

1. [*What value should be predicted?*] – select the field to be predicted. For example, to predict the account category, select the [*Category*] field from the list. The list contains all the lookup fields of the selected object. Creatio will display the prediction result as one of the [*Category*] lookup values.
2. [*Which columns does the predicted value depend on?*] – select the “Object column” or “Linked column” to add columns that determine the behavior algorithms connected to the predicted field. For example, if you normally determine an account’s category based on the number of company employees, revenue, and the account’s industry, add the [*No of employees*], [*Annual revenue*], and [*Industry*] object columns here. Creatio will analyze the historic values of these columns and how the values correlate with the relevant values in the [*Category*] column.
3. [*Which records should be included in the training dataset?*] – set up a filter Creatio will use to select the training records. For example, narrow down the training data range to only the records that have the account category. To do this, configure the following filter: “Category is filled in.”

You do not need to specify the filter conditions. Creatio will use all available records for training by default.

Note. You can already save the model and start training it by clicking the [*Train model*] button at this stage. You will see the training results in the [*Expected accuracy*] field. Fill out the [*What column to use for saving prediction result?*] field to save the prediction results.

4. [*What column to use for saving prediction result?*] – specify where Creatio will store the prediction results. Usually, Creatio saves the results to the column whose value was predicted. If you would rather Creatio did not modify the predicted column, select a different column here.
5. [*Automatic model training settings*] – toggle the switch and set the parameters for automatic model retraining with updated historical data.
 - a. Specify the interval between model training sessions in the [*Retrain after, days*] field. After the specified number of days, Creatio will retrain the model based on historical records that match the filter. The first

model training starts when you click the [*Train model*] button. If you would rather not retrain the model, leave the field blank or enter "0."

- b. Specify the lowest prediction model accuracy threshold in the [*Quality metric lower limit*] field. When you train the model for the first time, this threshold will determine the minimum acceptable quality that the model needs to reach before Creatio can use it. If the model quality drops below this limit, the model is deemed unusable. We recommend setting the quality metric lower limit to at least 0.50. The machine learning model accuracy score ranges from 0.00 to 1.00 (higher is better). Creatio calculates the machine learning model accuracy by dividing the number of successful predictions by the total number of predictions. Use the [Google documentation](#) to learn more about how the prediction accuracy score is calculated (Fig. 2).
6. Turn on the switch in the [*Setting up background update of prediction results*] field group to enable daily prediction result updates for the selected records during the minimum load period (Fig. 2). If you turn on the background updates without specifying the filter conditions, the model will update all records.

Note. Specify the period when the batch prediction will take place in the [*Maintenance periods*] [lookup](#).

Fig. 2 The ML lookup prediction model parameters

The screenshot shows the 'PARAMETERS' tab of a configuration interface. It contains several sections for setting up a prediction model:

- What value should be predicted?**: A dropdown menu with 'Category' selected.
- Which columns does the predicted value depend on?**: A list of columns including 'No. of employees', 'Annual revenue' (highlighted), and 'Industry'.
- Which records should be included in the training dataset?**: A section with a dropdown menu set to 'AND' and a condition 'Category is filled in'.
- What column to use for saving prediction result?**: A dropdown menu with 'Category' selected.
- Automatic model training settings**: A toggle for 'Update model automatically' is turned on. Below it, 'Retrain after, days' is set to 30 and 'Quality metric lower limit' is set to 0.50.
- Setting up background update of prediction results**: A toggle for 'Perform background update of prediction results daily during the maintenance window' is turned on. Below it, a condition 'Type = Customer' is set.

3. Add the advanced settings

Click the [*Advanced settings*] tab if you need to specify additional prediction model parameters.

1. Set up a query that selects additional columns used for value prediction in the [*Advanced tools to add columns*] field group. Note that the query setup requires coding. Learn more: [Creating data queries for the machine learning model](#).
2. Creatio populates the values in the [*Advanced model parameters*] field group (Fig. 3) automatically. You can edit the values, if necessary.
 - a. [*Minimum training record count*] – the minimum number of records needed to train a model.

- b. [*Maximum training record count*] – the maximum number of records needed to train a model.
- c. [*Predicted value selection method*] – can be “ML Engine Significance” or “Maximum probability.”
 - **“ML Engine Significance”** – default option. If selected, Creatio will determine the prediction quality based on the ML mechanism. If the prediction quality is sufficiently high, Creatio will save the predicted value to the relevant field.
 - **“Maximum probability”** – the minimum probability where the predicted value will still be saved automatically. If the predicted value is below this threshold, Creatio will not populate the prediction field automatically. However, Creatio will display the prediction when you fill out the field manually.

Fig. 3 The advanced ML lookup prediction model parameters

The screenshot displays the 'Advanced Settings' tab for an ML lookup prediction model. The configuration parameters are as follows:

Parameter	Value
Minimum training record count	100
Maximum training record count	75,000
Predicted value selection method	Maximum probability
Lower limit of probability for predicted value selection	0.50

3. Click [*Save*]. To start training a lookup prediction model, click [*Train model*].

Prediction results

This will add a new ML model to Creatio. If a business process triggers it, the model will predict and populate the values for the needed records.

Learn more: [Configure a prediction business process.](#)


The account category prediction model will analyze the values in the [*No of employees*], [*Annual revenue*], and [*Industry*] columns of accounts with the populated [*Category*] column. The more data it analyzes, the higher the quality of the metric.


Once the quality is high enough, the model will predict the value in the [*Category*] field based on the values in the [*No of employees*], [*Annual revenue*], and [*Industry*] fields. Creatio will automatically populate the lookup fields with predicted values, sorted by probability.

Depending on the probability ratio, Creatio distinguishes among the following prediction types:

- certain prediction
- near-certain prediction
- weak prediction


Certain prediction

A certain prediction is a prediction with an evident leader. In this case, Creatio automatically populates the field with the predicted value, and the  button appears next to it. Save the page if the field is populated correctly.


Click  to display all possible predictions and their probabilities with the most probable item highlighted.

If you modify the field, the  button will appear. Click the button to display all predictions.

Near certain prediction

If there are multiple values with close probabilities, Creatio will not populate the field, and the  button will appear next to it. Click the button to display the list of predictions and their probabilities.

Weak prediction

A weak prediction occurs when Creatio cannot compare the historical data to the data used for analysis. Creatio does not populate the field with a weak prediction, and the  button appears next to it. Click the button to display the list of predictions and their probabilities.

Numeric field value prediction

PRODUCTS: [ALL CREATIO PRODUCTS](#)

Creatio provides tools to create and set up machine learning models that predict the numeric field values. The predictions are based on the data available in the record and the previously processed records. For example, you can create a model that will predict the lead budget based on the customer need type and the customer's company size, country, and industry.

Note. Read more about ML models and their business use in the [Artificial intelligence and machine learning in Creatio](#) e-learning course.

Configure numeric predictions in several steps:

1. Set up and train an ML numeric prediction model.
2. Set up a [business process](#) with the [*Data prediction*] element.

Attention. Using predictive analysis in Creatio on-site requires additional preliminary setup. Read more: [Machine Learning service](#).

1. Add a new recommendation prediction model

Example. Create a model that will predict the lead budget based on the customer need type and the customer's company size, country, and industry.

To do so, set up and train a numeric field prediction model.

To create a numeric value prediction model:

1. Open the [*ML models*] section in the [*Studio*] workplace.
2. Click [*New*] → [*Numeric prediction*].
3. Fill out the ML model creation mini page (Fig. 1):
 - a. [*Name*] – the name of the prediction model. The name helps to identify the model in the [*ML models*] section list and select it when configuring the [*Data prediction*] business process element.
 - b. [*Type*] – the ML model type. For example, “Numeric prediction.” Creatio populates the field automatically when you select the model in the previous step.
 - c. [*Object*] — the prediction model will predict the records of this object (a section, a detail or a lookup). For example, “Lead.”

Fig. 1 The numeric value prediction model mini page

4. Click [*Next*] to save the mini page and open the numeric prediction model setup page.

2. Set up the model parameters

After you fill out the required model fields, specify the parameters:

1. [*What value should be predicted?*] – select the field to be predicted. For example, to predict the lead budget, select the [*Budget*] field from the list. The list contains all the numeric fields of the selected object.
2. [*Which columns does the predicted value depend on?*] – select the “Object column” or “Linked column” to add columns that determine the behavior algorithms connected to the predicted field. For example, if a lead budget depends on the customer need, the number of employees, the country, and the industry, add the [*Customer need*], [*No. of employees*], [*Country*], and [*Industry*] object columns. Creatio will analyze the historic values of these columns and how the values correlate with the relevant values in the [*Budget*] field.
3. [*Which records should be included in the training dataset?*] – set up a filter Creatio will use to select the training records. For example, select only the records with the lead budget. To do this, configure the following

filter: "Budget is filled in."

You do not need to specify the filter conditions. Creatio will use all available records for training by default.

Note. You can already save the model and start training it by clicking the [*Train model*] button at this stage. You will see the training results in the [*Expected accuracy*] field. Fill out the [*What column to use for saving prediction result?*] field to save the prediction results.

4. [*What column to use for saving prediction result?*] – specify where Creatio will store the prediction results. Usually, Creatio saves the results to the column whose value was predicted. If you would rather Creatio did not modify the predicted column, select a different column here.
5. [*Automatic model training settings*] – toggle the switch and set the parameters for automatic model retraining with updated historical data.
 - a. Specify the interval between model training sessions in the [*Retrain after, days*] field. After the specified number of days, Creatio will retrain the model based on historical records that match the filter. The first model training starts when you click the [*Train model*] button. If you would rather not retrain the model, leave the field blank or enter "0."
 - b. Specify the lowest prediction model accuracy threshold in the [*Quality metric lower limit*] field. When you train the model for the first time, this threshold will determine the minimum acceptable quality that the model needs to reach before Creatio can use it. If the model quality drops below this limit, the model is deemed unusable. We recommend setting the quality metric lower limit to at least 0.50. The machine learning model accuracy score ranges from 0.00 to 1.00 (higher is better). Creatio calculates the machine learning model accuracy by dividing the number of successful predictions by the total number of predictions. Use the [Google documentation](#) to learn more about how the prediction accuracy score is calculated.
6. Turn on the switch in the [*Setting up background update of prediction results*] field group to enable daily prediction result updates for all records during the minimum load period (Fig. 2). If you need to update only the specific records, set up the filter conditions.

Note. Specify the period when the batch prediction will take place in the [*Maintenance periods*] [lookup](#).

Fig. 2 The ML numeric prediction model parameters

<
PARAMETERS
ADVANCED SETTINGS
TRAINING
ATTACHMENTS AND NOTES
>

⬆
What value should be predicted?
i

Budget

⬆
Which columns does the predicted value depend on?
+
i

Country

Industry

No. of employees

Customer need

⬆
Which records should be included in the training dataset?

Actions

☒ Budget is filled in

☒ AND

+ Add condition

⬆
What column to use for saving prediction result?
i

Budget

⬆
Automatic model training settings
i

☒ Update model automatically

Retrain after, days
30

Quality metric lower limit
0.50

⬆
Setting up background update of prediction results

☒ Perform background update of prediction results daily during the maintenance window

Update all records that match condition

Actions

☒ AND

+ Add condition

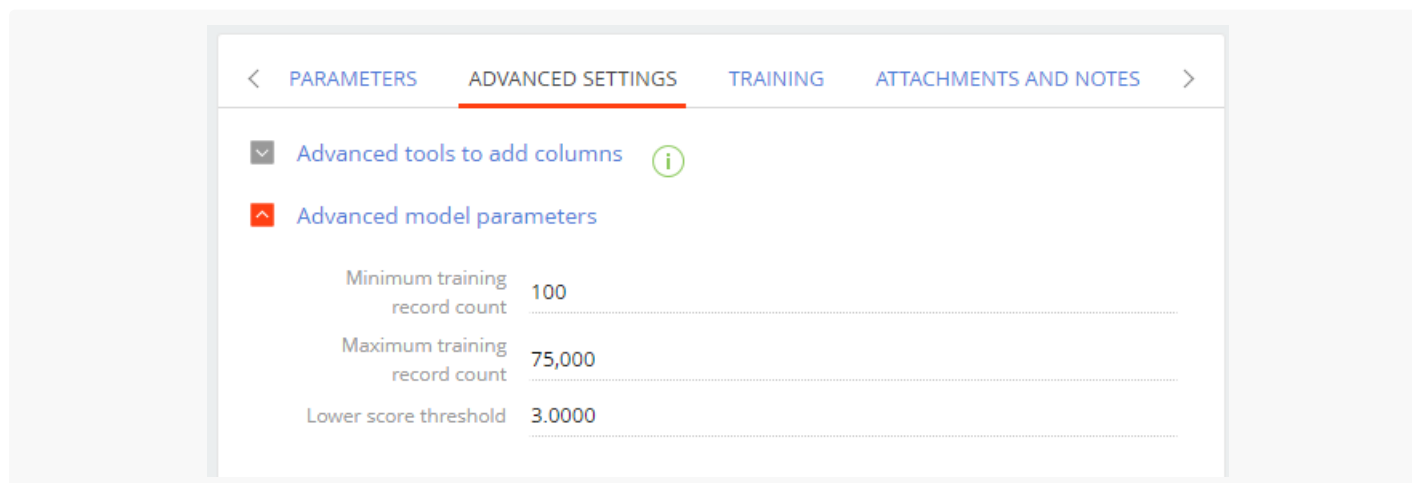
3. Add the advanced settings

Click the [*Advanced settings*] tab if you need to specify additional prediction model parameters. Fill out the fields similarly to the [lookup value prediction model](#) settings (Fig. 3) and click [*Save*]. To start training a numeric

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prediction model, click [*Train model*].

Fig. 3 The advanced ML numeric prediction model parameters



Prediction result

This will add a new ML model to Creatio. If a business process triggers it, the model will predict and populate the values for the needed records.

Learn more: [Configure a prediction business process](#).

The lead budget prediction model will analyze the values in the [*Customer need*], [*No. of employees*], [*Country*], and [*Industry*] fields of leads with the populated [*Budget*] field. The more data it analyzes, the higher the quality metric will become.

Once the quality is high enough, the model will predict the lead budget based on the values in the [*Customer need*], [*No. of employees*], [*Country*], and [*Industry*] columns.

Predictive scoring

PRODUCTS: [ALL CREATIO PRODUCTS](#)

Creatio provides tools to create and set up machine learning models that predict record scoring in any Creatio section. Predictive scoring estimates the probability of an event. For example, you can create a model that rates the lead conversion probability based on the budget and the history of successful hand-off to sales. [Predictive lead scoring](#) based on this prediction model is available out-of-the-box. That model is implemented via developer queries and tools. This article demonstrates how you can configure this prediction model without coding.

Creatio calculates the predictive score using a scale from 1 to 100 points. You can display the calculated value on the record page as a numeric field or a chart. Learn more: [Add analytics to a record page](#).

Note. Read more about ML models and their business use in the [Artificial intelligence and machine learning in Creatio](#) e-learning course.

Create event predictions in several steps:

1. Set up and train a new model.
2. Set up a [business process](#) with the [*Data prediction*] element.

Attention. Using predictive analysis in Creatio on-site requires additional preliminary setup. Read more: [Machine Learning service](#).

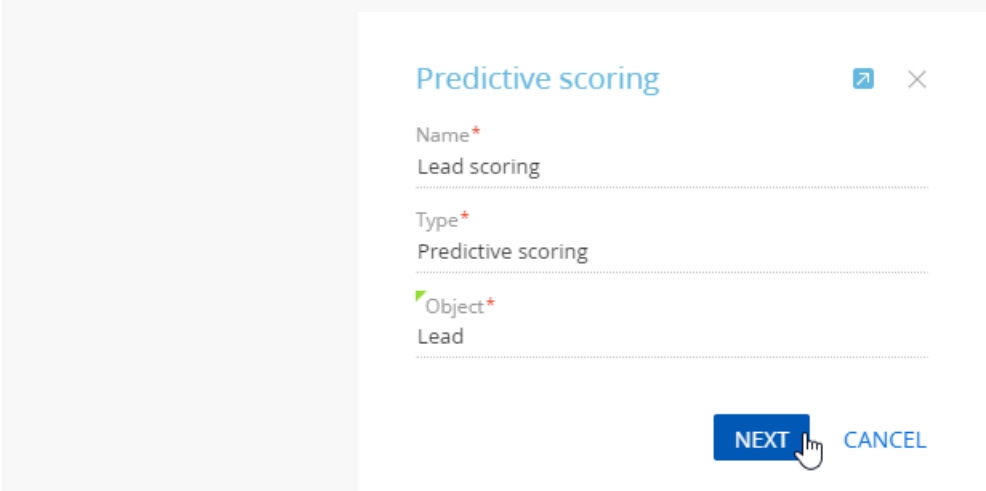
1. Add a new recommendation prediction model

Example. Set up the lead conversion probability prediction in the [*Leads*] section based on the lead stage, budget, and the annual revenue.

To so do, set up and train a predictive scoring model.

1. Open the [*ML models*] section in the [*Studio*] workplace.
2. Click [*New*] - [*Predictive scoring*].
3. Fill out the ML model creation mini page (Fig. 1):
 - a. [*Name*] - the name of the prediction model. The name helps to identify the model in the [*ML models*] section list and select it when configuring the [*Data prediction*] business process element.
 - b. [*Type*] - the ML model type. For example, "Predictive scoring." Creatio populates the field automatically when you select the model in the previous step.
 - c. [*Object*] — the prediction model will predict the records of this object (a section, a detail or a lookup). For example, "Lead."

Fig. 1 The predictive scoring model mini page



4. Click [*Next*] to save the mini page and open the predictive scoring model setup page.

2. Set up the model parameters

After you fill out the required model fields, specify the parameters:

1. [*What records to be considered as successful?*] – set up a filter Creatio will use to determine the most “successful” records, i.e., the records that should have the highest score. In this case, a lead is considered successful if its budget is higher than \$50,000 and if it was successfully handed off to sales (Fig. 3). To do this, configure the following filters: “Budget > 50,000.00” and “Stage = Handoff to sales.”
2. [*Which columns does the predicted value depend on?*] – select the “Object column” or “Linked column” to add columns that Creatio will analyze to predict the lead quality. For example, if the lead quality is based on the budget, annual revenue, and its stage in the pipeline, add the [*Budget*], [*Annual revenue*], and [*Lead stage*] object columns here. Creatio will analyze the historic values of these columns, compare the columns to the most successful records, and predict the score.
3. [*Which records should be included in the training dataset?*] –
specify the filter Creatio will use to select the training records. Creatio will use these records to determine the correlation between the predicted lead quality and the columns used for prediction. For example, select only the records with the lead budget. To do this, configure the following filter: “Budget is filled in.”

You do not have to specify the filter conditions. Creatio will use all available records for training by default.

Note. You can already save the model and start training it by clicking the [*Train model*] button at this stage. You will see the training results in the [*Expected accuracy*] field. Fill out the [*What column to use for saving prediction result?*] field to save the prediction results.

4. [*What column to use for saving prediction result?*] – specify where Creatio will store the prediction results. Usually, Creatio saves the results to the column whose value was predicted. If you would rather save the prediction result to another column, specify it in this field. For example, add a [*Predictive budget*] column to the lead page and save the results there. You can add a special column that will store the prediction results in the Section Wizard. Learn more: [Set up page fields](#).
5. [*Automatic model training settings*] – toggle the switch and set the parameters for automatic model retraining with updated historical data.
 - a. Specify the interval between model training sessions in the [*Retrain after, days*]. After the specified number of days, Creatio will retrain the model based on historical records that match the filter. The first model training starts when you click the [*Train model*] button. If you would rather not retrain the model, leave the field blank or enter “0.”
 - b. Specify the lowest prediction model accuracy threshold in the [*Quality metric lower limit*] field. When you train the model for the first time, this threshold will determine the minimum acceptable quality that the model needs to reach before Creatio can use it. If the model quality drops below this limit, the model is deemed unusable. We recommend setting the quality metric lower limit to at least 0.50. The machine learning model accuracy score ranges from 0.00 to 1.00 (higher is better). Creatio calculates the machine learning model accuracy by dividing the number of successful predictions by the total number of predictions. Use the [Google documentation](#) to learn more about how the prediction accuracy score is calculated.
6. Turn on the switch in the [*Setting up background update of prediction results*] field group to enable daily prediction result updates for all records during the minimum load period (Fig. 2). If you need to update only the specific records, set up the filter conditions.

Note. Specify the period when the batch prediction will take place in the [*Maintenance periods*] [lookup](#).

Fig. 2 The predictive scoring model parameters

PARAMETERS
ADVANCED SETTINGS
TRAINING
ATTACHMENTS AND NOTES
FEED

What records to be considered as successful? ⓘ

Actions

☒
Budget
>
50,000.00

☒
AND

☒
Lead stage
=
Handoff to sales

+
Add condition

Which columns does the predicted value depend on? + ⓘ

0.5
Budget
Annual revenue
Lead stage

Which records should be included in the training dataset?

Actions

☒
Budget
is filled in

☒
AND

+
Add condition

What column to use for saving prediction result? ⓘ

Predictive score

Automatic model training settings ⓘ

☒
Update model automatically

Retrain after, days
30

Quality metric lower limit
0.00

Setting up background update of prediction results

☒
Perform background update of prediction results daily during the maintenance window

Update all records that match condition

Actions

☒
AND

+
Add condition

3. Add the advanced settings

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Click the [*Advanced settings*] tab if you need to specify additional prediction model parameters. Fill out the fields similarly to the [lookup value prediction model](#) settings (Fig. 3) and click [*Save*]. To start training a predictive scoring model, click [*Train model*].

Fig. 3 The advanced settings of the predictive scoring model

ADVANCED SETTINGS	
Advanced tools to add columns	(i)
Advanced model parameters	
Minimum training record count	100
Maximum training record count	75,000
Lower score threshold	3.0000

Prediction result

This will add a new ML model to Creatio. If a business process triggers it, the model will predict the score for the needed records.

Learn more: [Configure a prediction business process](#).

The lead score prediction model will analyze the values in the [*Budget*], [*Annual revenue*], and [*Lead stage*] columns of leads with the populated [*Budget*] field and compare the values to all the leads that have been handed off to sales. The more data the model analyzes, the higher the quality of the metric.

Once the quality is high enough, the section will provide the predicted lead rating based on the values in the [*Budget*], [*Annual revenue*], and [*Lead stage*] columns.

Recommendation prediction

PRODUCTS: [ALL CREATIO PRODUCTS](#)

Recommendation ML models create lists of objects (recommendations) that are likely to be linked to the “subject” records (the recommendation recipients). For example, you can recommend products to your customers based on what the similar clients purchase. Product recommendations with this prediction model are available in Creatio Sales lineup out-of-the-box. This article demonstrates how you can configure this prediction model without coding.

This product recommendation model training method is known as [collaborative filtering](#). The collaborative filtering model uses the subject’s known preferences, as well as the preferences of the subjects that are similar to the target subject in certain criteria.

Creatio uses an item-based algorithm to predict the preferences. Creatio builds recommendation lists by summarizing and ranking the data about the interactions with the recommendation objects.

Note. Read more about the ML models and their business use in the [Artificial intelligence and machine learning in Creatio](#) e-learning course.

To implement a recommendation model:

1. Set up and train a new recommendation model.
2. Set up a [business process](#) with the [*Data prediction*] element.

Attention. Using predictive analysis in Creatio on-site requires additional preliminary setup. Read more: [Machine Learning service](#).

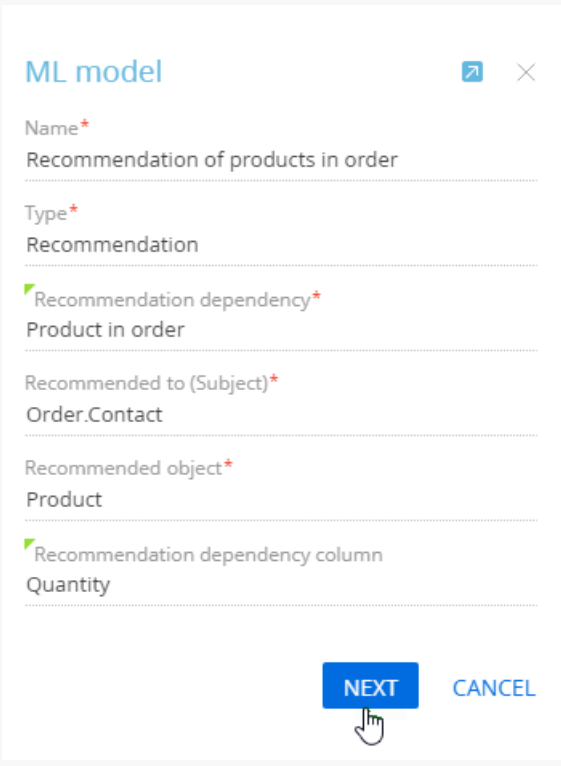
1. Add a new recommendation prediction model

Example. Set up a machine learning model that will recommend products that a customer is the most likely to purchase.

To create a prediction recommendation result:

1. Open the [*ML models*] section in the [*Studio*] workplace.
2. Click [*New*] - [*Recommendations*].
3. Fill out the ML model creation mini page (Fig. 1):
 - a. [*Name*] - the name of the prediction model. The name helps to identify the model in the [*ML models*] section list and select it when configuring the [*Data prediction*] business process element.
 - b. [*Type*] - the ML model type. In our example, it is "Recommendation". Creatio populates the field is populated automatically when you select the model in the previous step.
 - c. [*Recommendation dependency*] - select the object that maintains a connection between the recommendation subject (for example, the customer) and the recommendation object (for example, the product). For instance, the customer is connected to the product through the "Product in order" object. When you select the connecting object, the mini page will display additional fields.

Fig. 1 The product recommendation model mini page



ML model

Name*
Recommendation of products in order

Type*
Recommendation

Recommendation dependency*
Product in order

Recommended to (Subject)*
Order.Contact

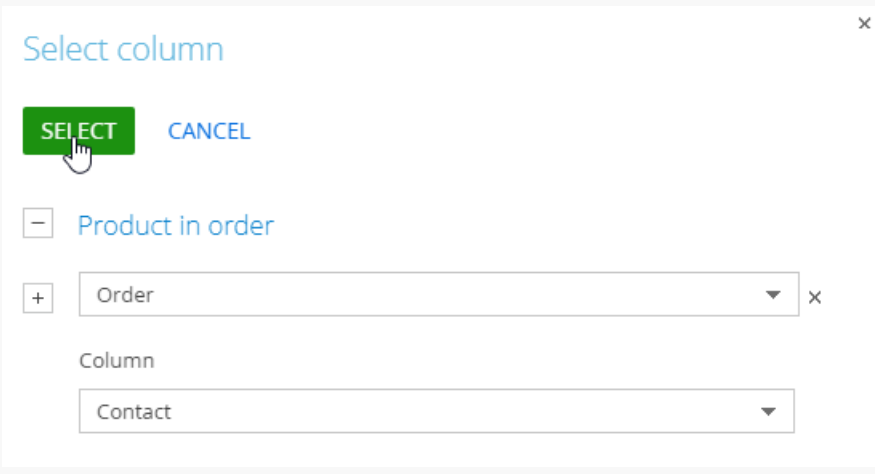
Recommended object*
Product

Recommendation dependency column
Quantity

NEXT CANCEL

- d. [*Recommended to (Subject)*] – Creatio will generate the list of recommended objects for this column. In our example, Creatio will recommend the products to the contacts specified in the order. Click “+” and select the [*Order*] object, then the connected [*Contact*] object (Fig. 2):

Fig. 2 Selecting the recommendation subject column



Select column

SELECT CANCEL

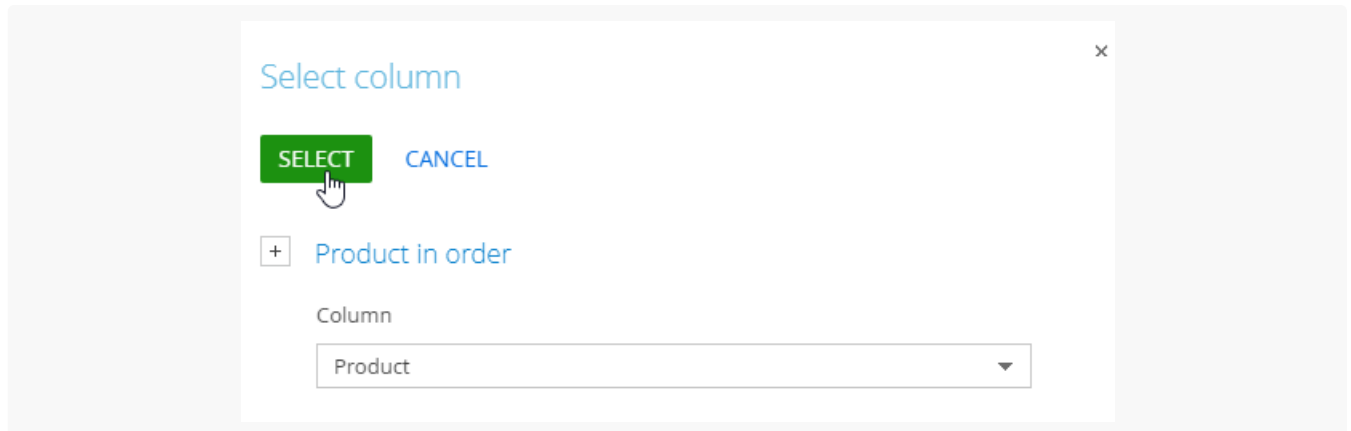
– Product in order

+ Order

Column
Contact

- e. [*Recommended object*] – select the recommendation object. In our example, it is the [*Product*] column of the “Product in order” object (Fig. 3):

Fig. 3 Selecting the recommendation object column



- f. [*Recommendation dependency column*] – select a numeric column in the section, detail or lookup specified in the [*Recommendation dependency*] field. Creatio will use this column to grade the “quality” of dependency between the recommendation subject and the recommended object. For example, if you select the [*Quantity*] column, the number of products the contact ordered will determine the quality of dependency between the corresponding contact and different products. The more products a contact buys, the “higher” the contact’s dependency with the recommended object is, making Creatio more likely to recommend this product.

This field is not required. If you do not fill out the field, Creatio will evaluate the connection between the subject and the object in a binary way: “0” – connection does not exist; “1” – connection exists.

4. Click [*Next*] to save the mini page and open the product recommendation model setup page.

2. Set up the model parameters

After you fill out the required model fields, specify the parameters:

1. [*Which records should be included in the training dataset?*] – set up a filter Creatio will use to select the training records. For example, narrow down the training data range to products from the completed orders only. To do this, configure the following connected object filter: “Order.State = Closed”.

You do not need to specify the filter conditions. Creatio will use all available records for training by default.

Note. You can already save the model and start training it by clicking the [*Train model*] button at this stage. You will see the training results in the [*Expected accuracy*] field. To save the prediction results, fill out the [*Setting up saving prediction results*] detail.

2. [*Automatic model training settings*] – toggle the switch and set the parameters for automatic model retraining with the updated historical data.
- Specify the interval between model training sessions in the [*Retrain after, days*] field. After the specified number of days, Creatio will retrain the model based on historical records that match the filter. The first model training starts when you click the [*Train model*] button. If you would rather not retrain the model, leave the field blank or enter “0.”
 - Specify the lowest prediction model accuracy threshold in the [*Quality metric lower limit*] field. When you train the model for the first time, this threshold will determine the minimum acceptable quality that the model needs to reach before Creatio can use it. If the model quality drops below this limit, the model is deemed unusable. We recommend setting the quality metric lower limit to at least 0.50. The machine

learning model accuracy score ranges from 0.00 to 1.00 (higher is better). Creatio calculates the machine learning model accuracy by dividing the number of successful predictions by the total number of predictions. Use the [Google documentation](#) to learn more about how the prediction accuracy score is calculated.

3. [*Setting up saving prediction results*] – specify where Creatio will store the prediction results. You can save the prediction to any Creatio object that has the following required fields: [*Recommended to (Subject)*], [*Recommended object*] (“Lookup” type), and [*Probability*] (“Decimal” type) For example, you can add a [*Product recommendations*] detail to a contact page. Learn more: [Create new detail](#).

If you select this detail as a prediction object, Creatio will select the columns of a suitable type automatically. If there is more than one such column, Creatio will automatically select the first column. You will be able to select a different column from the dropdown. If the object has no such columns, Creatio will not populate the field. We recommend checking the selected values before saving the model.

- a. Specify the object that will store the recommendations in the [*Object*] field. It is usually a detail. Note that you can only specify an existing Creatio object. In this example, you can specify the preset [*Product recommendations*] detail. When you select an object, the [*Recommended to (Subject)*] and [*Recommended object*] fields become required.
- b. [*Recommended to (Subject)*] — determines the recommendation subject. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Contact.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. The field is required.
- c. [*Recommended object*] — determines the recommendation object. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Product.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. The field is required.
- d. [*Probability*] — ranks the records. In this example, the higher the column value is, the more likely the opportunity is to succeed. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Probability.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. The field is required.
- e. [*ML model*] — specifies the name of the ML model used for the prediction. In this example, specify the recommendation model name. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “ML model.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. We recommend filling out this field if you use several prediction models.
- f. [*Prediction date*] — specifies when the prediction was made. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Prediction date.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. (Fig. 4).

Fig. 4 The product recommendation model parameters

The screenshot shows the 'PARAMETERS' tab of a configuration interface. It contains three main sections:

- Which records should be included in the training dataset?**
 - Actions** (dropdown menu)
 - ☒ **AND**
 - ☒ Order.Status = 4. Completed
 - [+ Add condition](#)
- Automatic model training settings** (with an information icon)
 - ☐ Update model automatically
 - Retrain after, days: 30
 - Quality metric lower limit: 0.55
- Setting up saving prediction results**
 - Object: Recommended product
 - Recommended to (Subject)*: Contact
 - Recommended object*: Product
 - Probability: Score
 - ML model: MIModel
 - Prediction date: Prediction Date

3. Add the advanced settings

Click the [*Advanced settings*] tab if you need to specify additional prediction model parameters. Fill out the fields similarly to the settings for the [lookup value prediction model](#). Additionally, check the auto-populated values in the fields specific to this ML model.

1. [*List of factors count*] - a pre-configured list of metric numbers for each recommendation object and subject. Creatio will analyze this list to prepare the recommendations.
2. [*List of regularization values*] - a pre-configured list of additional restrictions. Creatio will add the restrictions to minimize errors and avoid model retraining.

Fig. 5 The advanced model parameters

Advanced model parameters	
Training dataset minimum size	100
Maximal training records count	75,000
List of factors count	2; 5; 10; 15; 20; 50; 100
List of regularization values	0.1; 2; 5; 10; 15; 20; 25

Prediction result

This will add a new model to Creatio. You will be able to use the model to run processes that predict recommendations for the selected Creatio objects.

Learn more: [Configure a prediction business process.](#)

In this example, the product recommendation model will analyze the relationship between the recommendation subject as well as other similar subjects with the [*Product in order*] object and generate a recommendation list. The training record selection will be restricted to completed orders. Creatio will rank the recommendation list based on the number of purchased products. Note that recommendation prediction will be performed only for those customers (recommendation subjects) and products (recommendation objects) that were part of the training, i.e., were included in the training selection.

As a result, Creatio will display the recommended products on the relevant contact pages' [*Recommended products*] detail (Fig. 6):

Fig. 6 Product recommendation on a contact page

Alexander Wilson

What can I do for you? **Creatio** 7.16.1.2135

NEXT STEPS (8)

Define the problem with Laserjet Pro CP1025nw 5/17/2020 Supervisor	Meet with Wilson in his office 5/19/2020 Supervisor	Analyze the case 5/19/2020 William Walker
Call back the customer. Inform him about the case resolution. 5/19/2020 William Walker	Conference call (Alpha Business) 5/20/2020 Supervisor	Call back to the client. Inform about case resolution 5/21/2020 Supervisor

CONTACT INFO

Type: Customer
Title: Mr.
Age: 35
Owner: Supervisor
Gender: Male
Preferred language: English (United States)

Sentiment: 9 (0 to 100 scale)

Churn Rate: 24 (0 to 100 scale)

Recommended product

Contact	Product	MLModel	Prediction Date
Alexander Wilson	Preparing software documentation	Product recommendations	6/17/2020 12:24 PM
Alexander Wilson	Microsoft Office English	Product recommendations	6/17/2020 12:24 PM
Alexander Wilson	Website development	Product recommendations	6/17/2020 12:24 PM

Similar text search

PRODUCTS: **ALL CREATIO PRODUCTS**

In Creatio, you can configure and train recommendation prediction models to create lists of similar records based on the unstructured text data analysis. For example, you can set up the automatic knowledge base article selection, automatic solution search, and more. [Similar case search](#) based on this prediction model is available out-of-the-box.

This recommendation prediction model training method known as content-based filtering. The method evaluates the text similarity using the content traits of specific objects, for example, text data. Creatio aggregates and ranks the prediction subject and object text parameters to generate lists of similar records, such as similar cases.

Note. Read more about ML models and their business use in the [AI tools](#) e-learning course.

To generate a list of similar objects:

1. Set up and train the similar text search model.
2. Set up a [business process](#) with the [*Data prediction*] element.

Attention. Using predictive analysis in Creatio on-site requires additional preliminary setup. Read more: [Machine Learning service](#).

1. Add a new recommendation prediction model

Example. Set up a search for similar problems by subject and description in the [*Problems*] section. Users will be able to link them to the relevant problem. To do so, set up and train the similar text search model.

To set up the similar text search model:

1. Open the [*ML models*] section in the [*Studio*] workplace.
2. Click [*New*] → [*Text similarity*].
3. Fill out the ML mode creation mini page (Fig. 1):
 - a. [*Name*] – the name of the prediction model. The name helps to identify the model in the [*ML models*] section list and select it when configuring the [*Data prediction*] business process element.
 - b. [*Type*] – the ML model type. For example, “Text similarity.” Creatio populates the field automatically when you select the model in the previous step.
 - c. [*Search for similar among (Object)*] – Creatio will search for similar texts within this object. For example, “Case.”
 - d. [*Search for similar to (Subject)*] – Creatio will compare the records with this object. For example, select the “Problem” object to find cases related to the same issue.

Fig. 1 The similar text search model mini page

4. Click [*Next*] to save the mini page and open the similar text search model setup page.

2. Set up the model parameters

After you fill out the required model fields, specify the parameters:

1. [*Which records should be included in the training dataset?*] – set up a filter Creatio will use to select the training records. For example, narrow down the training data range to texts in closed cases only. To do this, configure the following filter: “State = Closed”.

You do not need to specify the filter conditions. Creatio will use all available records for training by default.

Note. You can already save the model and start training it by clicking the [*Train model*] button at this stage. You will see the training results in the [*Expected accuracy*] field. To save the prediction results, fill out the [*Setting up saving prediction results*] detail.

2. [*Which columns does the predicted value depend on?*] – select “Object's columns” or “Linked columns” and add columns whose data will be searched. For example, select the [*Description*] and [*Subject*] columns. You can only select text fields.
3. [*Search similar values by these columns*] – select “Object's columns” or “Linked columns” and add columns required to search for similar data. For example, select the [*Resolution*], [*Subject*], and [*Description*] fields. You can only select text fields.
4. [*Setting up saving prediction results*] – specify where Creatio will store the prediction results. You can save the prediction to any Creatio object that has the following required fields: [*Similar to (Subject)*], [*Similar object*] (“Lookup” type), and [*Probability*] (“Decimal” type) For example, you can add the [*Similar cases prediction*] detail on the problem page. Read more: [Create new detail](#).

If you select this detail as a prediction object, Creatio will select the columns of a suitable type automatically. If there is more than one such column, Creatio will automatically select the first column. You will be able to select a different column from the dropdown. If the object has no such columns, Creatio will not populate the field. We recommend checking the selected values before saving the model.

- a. [*Object*] – specify the object that will store similar records. It is usually a detail. Note that you can only specify an existing Creatio object. For example, specify the [*Similar cases prediction*] detail. When you select an object, the [*Similar to (Subject)*] and [*Similar object*] fields become required.
- b. [*Similar to (Subject)*] – determines the ML model object. For example, similar cases. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Similar case.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. The field is required.
- c. [*Similar object*] – determines the ML model subject. For example, the problem for which the search for similar cases is run. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Problem.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. The field is required.
- d. [*Probability*] – ranks the records. For example, the higher the column value is, the higher is the text similarity. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “Score.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. The field is required.
- e. [*ML model*] – specifies the name of the ML model used for the prediction. In this example, specify the text similarity model name. Creatio automatically populates the field with the value of the object column specified in the previous step. For example, “ML model.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. We recommend filling out this field if you use several prediction models.
- f. [*Prediction date*] – specifies when the prediction was made. Creatio automatically populates the field with

the value of the object column specified in the previous step. For example, “Prediction date.” If necessary, you can change the value by selecting another column of the appropriate type from the dropdown. (Fig. 2).

Fig. 2 The similar text search model parameters

The screenshot displays the 'PARAMETERS' tab of a configuration interface. It contains four main sections:

- Which records should be included in the training dataset?** (with an information icon):
 - Actions ▾
 - ☒ Status = Closed
 - ☒ AND
 - + Add condition
- Which columns does the predicted value depend on?** (with a plus icon and an information icon):
 - T Description
 - T Subject
- Search similar values by these columns** (with a plus icon and an information icon):
 - T Description
 - T Resolution
 - T Subject
- Setting up saving prediction results**:

Object	Similar case prediction
Similar to (Subject)*	Similar case
Similar object*	Problem
Score	Score
ML model	ML model
Prediction date	Prediction date

5. [*Automatic model training settings*] – toggle the switch and set the parameters for automatic model retraining with updated historical data.
 - a. Specify the interval between model training sessions in the [*Retrain, days*] field. After the specified number of days, Creatio will retrain the model based on historical records that match the filter. The first model training starts when you click the [*Train model*] button. If you would rather not retrain the model, leave the field blank or enter “0.”
 - b. Specify the lowest prediction model accuracy threshold in the [*Quality metric lower limit*] field. When you

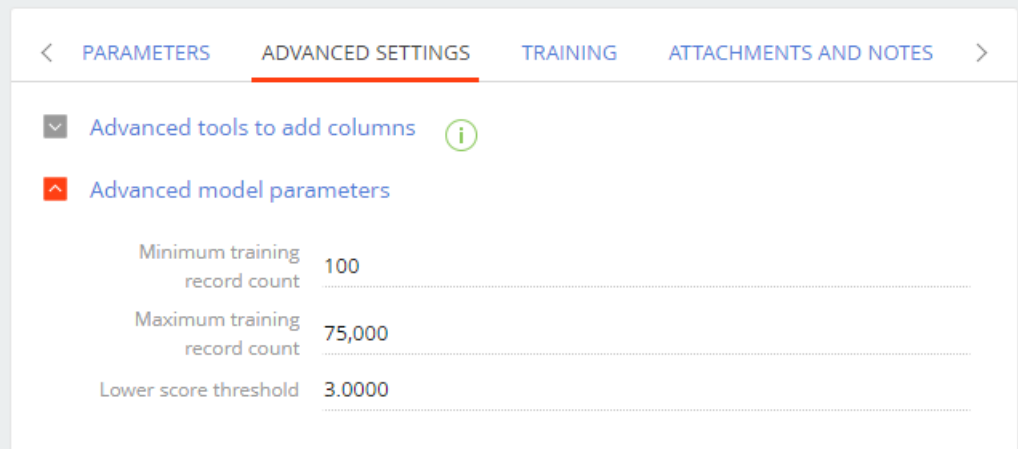
train the model for the first time, this threshold will determine the lowest possible quality the model needs to reach before Creatio can use it. If the model quality drops below this limit, the model is deemed unusable. We recommend setting the quality metric lower limit to at least 0.50. The machine learning model accuracy score ranges from 0.00 to 1.00 (higher is better). Creatio calculates the machine learning model accuracy by dividing the number of successful predictions by the total number of predictions. Use the [Google documentation](#) to learn more about how the prediction accuracy score is calculated.

6. To enable daily prediction result updates for the selected records during the minimum load period, toggle the switch in the [*Setting up background update of prediction results*] field group and set the filter conditions.

3. Add the advanced settings

Click the [*Advanced settings*] tab if you need to specify additional prediction model parameters. Fill out the fields similarly to the [lookup prediction model](#) settings. Additionally, check the auto-populated value in the field specific to this ML model. [*Lower score threshold*] – the lowest similarity score at which a record can be listed as a possible match (Fig. 5).

Fig. 3 The advanced parameters of the similar text search model



Parameter	Value
Minimum training record count	100
Maximum training record count	75,000
Lower score threshold	3.0000

Prediction result

This will add a new model to Creatio. You will be able to use the model to run processes that search for similar Creatio objects by unstructured text data.

Read more: [Configure a prediction business process](#).

For example, the similar text search model will analyze the text data of the [*Case*] object, compare it with the text data of the [*Problem*] subject, and then generate a list of similar records. The training record selection will be restricted to the closed cases. The model will rank the list of similar cases based on the similarity score.

As a result, Creatio will display similar cases on the [*Similar cases prediction*] detail of the problem page (Fig. 4).

Fig. 4 A list of similar cases

Similar cases

Refresh

Similar case SR00000014	Score 1.0000	Subject Laptop diagnostics	Registration date 2/7/2021 7:15 PM	Prediction quality
Symptoms Laptop diagnostics required due to performance drop				
Similar case SR00000028	Score 1.0000	Subject Laptop diagnostics	Registration date 3/31/2021 10:05 AM	Prediction quality
Symptoms Laptop diagnostics required due to performance drop				
Similar case SR00000042	Score 0.3268	Subject The performance drop	Registration date 4/5/2021 1:20 PM	Prediction quality

Train prediction models

PRODUCTS: [ALL CREATIO PRODUCTS](#)

The models are trained in the cloud service. Due to historical data analysis Creatio determines certain patterns that may further be used for predictions. The data used for model training is not saved in the cloud service. Instead, the cloud service is used to store the prediction patterns. Increasing the volume of historical data increases the accuracy of predictions. Therefore, all models must be retrained regularly.

Note. Predictive analytics in Creatio enables you to train models on collections containing up to 75,000 historical records. If a collection contains more than 75,000 records, the service will randomly select 75,000 records from the collection to train a machine learning model. To achieve the quality metric lower limit of 50%, it is recommended to use at least 20,000 historical records for training models that perform text data analysis and at least 1,000 historical records for training models that perform numeric data analysis.

The training progress bar on the machine learning model page enables you to track the current training stage of a model (Fig. 1).

Fig. 1 Training progress bar

Name*

Case priority prediction

Type*

Lookup prediction

Object*

Case

Not started

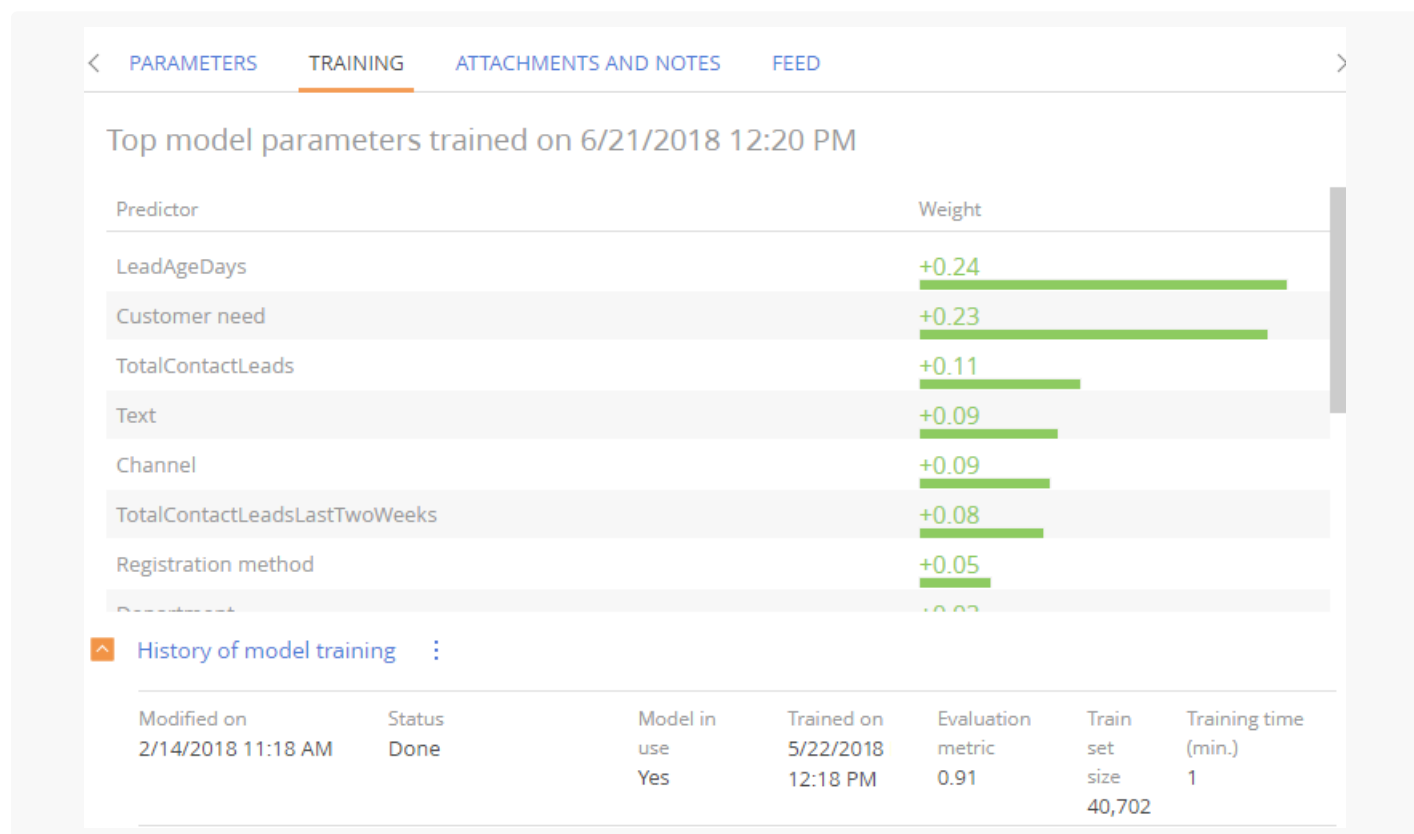
Prediction enabled

☐

Once the model is successfully trained, a machine learning model instance is created and activated automatically. Retraining models and saving new instances occurs automatically in the background mode. Retraining frequency is configured in the [*ML models*] section.

The list of factors that affect the evaluation metric or the quality of a trained ML model (aka “predictors”) are displayed on the [*Training*] tab of the model, at the top of the page (Fig. 2). The numbers show how strongly each factor will affect the prediction result. The factors will be displayed once the model training is complete.

Fig. 2 Factors that influence the predictive score



When setting up prediction models, the analysts can use this data to fine-tune the model parameters.

Implement prediction models

PRODUCTS: [ALL CREATIO PRODUCTS](#)

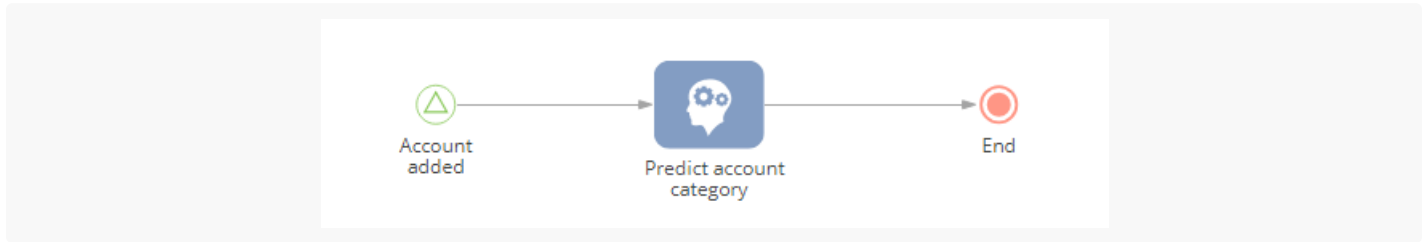
Once your prediction model is created, set up the actual data prediction in a business process using the [*Predict data*] process element. This will give you complete control over what records are predicted and when.

Implement the lookup value prediction

Set up a prediction of the account category whenever a new account with an empty [*Category*] field is saved (Fig. 1).

In this example, we will be using the [account category prediction model](#) created earlier.

Fig. 1 An ML model implementation process



To implement this:

1. Create a new business process from the process library and add the [*Signal*] start event to the diagram. The start event should be triggered whenever a new record is added to the [*Accounts*] section. Specify the signal element properties (Fig. 2):

Fig. 2 The signal element properties

- a. [*Which type of signal is received?*] - "Object signal."
- b. [*Object*] - "Account."
- c. [*Which event should trigger the signal?*] - "Record added."
- d. [*The added record must meet filter conditions*] - "Category is not filled in."
- e. [*Run following elements in the background*] - selected. This way, the process will run all elements from the [*System actions*] group in the background and will not display the loading mask.

2. Select the [*Predict data*] element in the [*System actions*] group and add it to the process diagram. Set up the element properties (Fig. 3):

Fig. 3 The [*Predict data*] element setup area

- a. Select the prediction model in the [*Machine learning model*] list. For example, to predict the category of an account, select the “Account category” model created earlier. Learn more: [Lookup value prediction model](#).

Note. Train prediction models before using them in business processes. Untrained models are not available in the [*Machine learning model*] field of the [*Predict data*] element. Learn more: [Train prediction models](#).

- b. [*What type of prediction to use?*] – “Predicting for one record.”
- c. Click the ⚡ button and select [*Process parameter*] in the [*What record to perform prediction on?*] field. Go to the [*Process elements*] tab in the opened window and select the signal created in the previous step, as well as the [*Unique identifier of record*] parameter.

3. Save the process.

As a result, whenever the [*Predict data*] element is triggered during a business process, it will use the selected ML model to predict the data of the specified record. In this example, the model will predict and populate the [*Category*] field value each time a new record is saved in the [*Accounts*] section. The prediction will be based on the values specified by users when filling out the [*Category*] field of historical records.

Implement the recommendation prediction

You can set up the product recommendation prediction for certain product types to hold an advertising campaign (Fig. 4). For example, run a business process manually to recommend five products of “Motherboards” type to all contacts of a “Customer” type.

In this example, we will be using the [product recommendation model](#) created earlier.

Fig. 4 A business process with the recommendation prediction



To implement this:

1. Create a new business process from the process library. Use the [*Simple*] start event to start the business process manually. The event is added to the diagram by default.
2. Select the [*Predict data*] element in the [*System actions*] group and add it to the process diagram. Set up the element properties (Fig. 5):

Fig. 5 The [*Predict data*] element properties

The screenshot shows the 'Predict data' configuration window. The title bar is blue with a gear icon and the text 'Predict data'. Below the title bar is a blue header with a gear icon and the text 'Product recommendation'. The main content area is white and contains the following settings:

- Machine learning model***: Product recommendations
- Recommended to (Subject)**:
 - Actions: ☒ Type = Customer
 - ☒ AND [+ Add condition](#)
- Recommended object**:
 - Actions: ☒ Type = Motherboards
 - ☒ AND [+ Add condition](#)
- Number of recommended Items**: 5
- ☒ Receive recommendations for an item previously interacted

- a. [*Machine learning model*] – specify the name of the recommendation model.
- b. [*Recommended to (Subject)*] – specify the filter. Select all or specific contacts that will receive recommendations. The filter must be specified to validate the element. For this example, select the contacts

of the “Customer” type.

- c. [*Recommended object*] – specify the filter if you need to restrict the recommendation selection to solve a specific business problem. For example, you can recommend only products of a certain type to your customers. In this example, these are motherboards.
- d. [*Number of recommended items*] – specify how many records the recommendation list should contain. For example, restrict the number of recommendations to five.
- e. [*Receive recommendations for an item previously interacted*] – select the checkbox to include only the products with which the customers interacted into the recommendations.

3. Add the terminate event and save the process.

As a result, whenever the [*Predict data*] element is triggered during a business process, it will use the specified ML model to generate a list of recommendations. In this example, the selection of training records will be restricted to the “Motherboards” product type. The list of recommendations consisting of five records will be generated for all contacts of the “Customer” type.