Amazon SageMaker Canvas

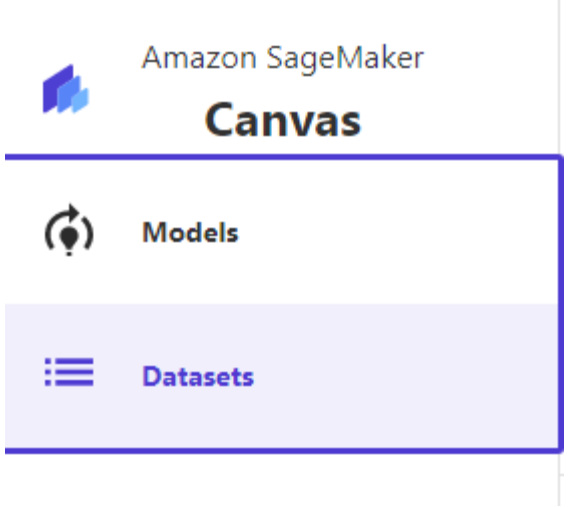
Use AWS Academy in Virginia

What is SageMaker Canvas

- Another tool to automate the ML workflow to reduce manual efforts
- SageMaker Canvas uses Autopilot (next lecture) service under the hood
- It is a fully managed no code ML solution with interactive UI
- You can finish the entire ML workflow with a few point-and-click

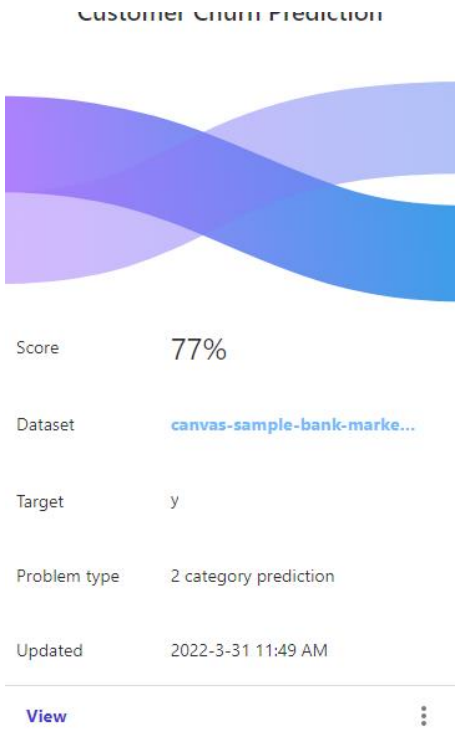
Canvas Interface

- There are two main pages in Canvas: the **Models** page and the **Datasets** page.



Model Page

- The **Models** page shows the models you've created in Canvas.



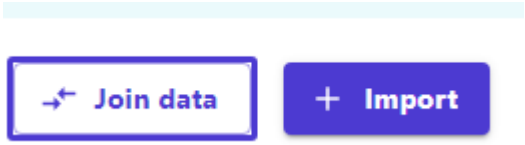
Datasets page

- The **Datasets** page shows the datasets you've imported

Source	Columns	Rows	Cells	Created	Status
S3	21	41,190	864,990	12/21/2021 8:58 AM	Ready

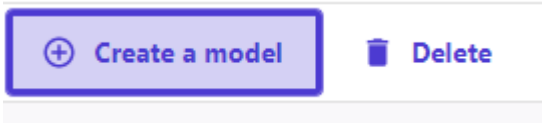
Steps to build a model

- First, **join** or **import** new datasets into Canvas.



- After importing new datasets, **choose** a dataset you want to build a model with.

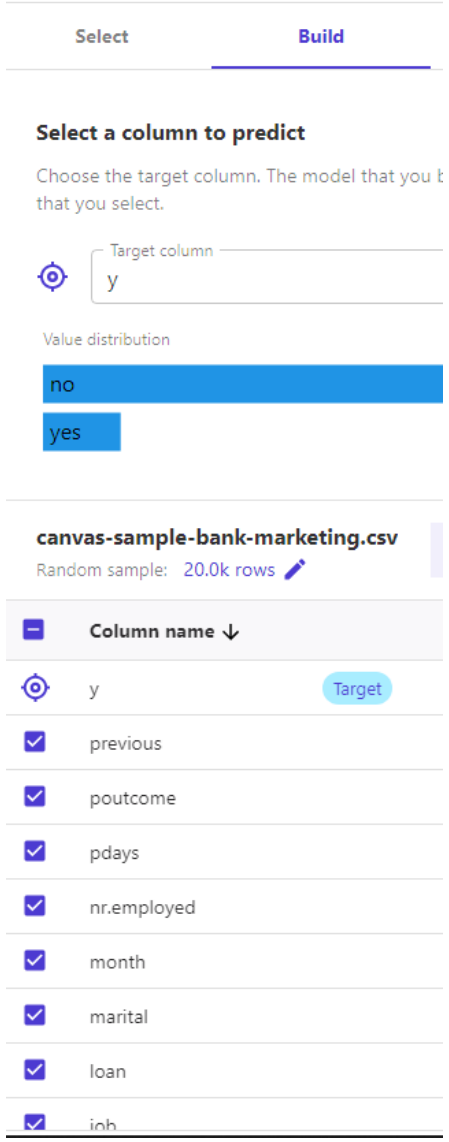
- Then click on Create a model



Prepare to build

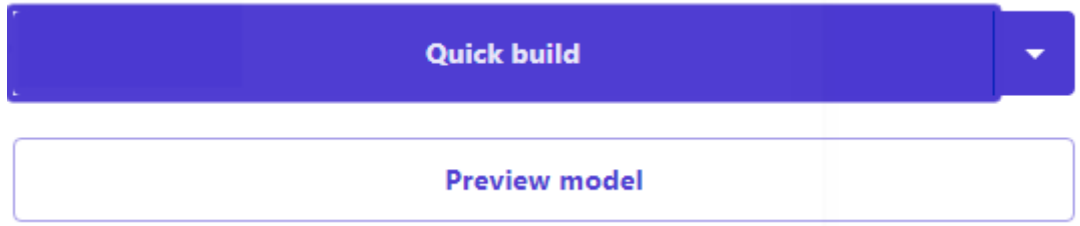
- In the **Build** tab, before building a model, review and prepare your chosen dataset at the bottom of the page.

Then, select the **Target column** in the top left section.



Click to build your model

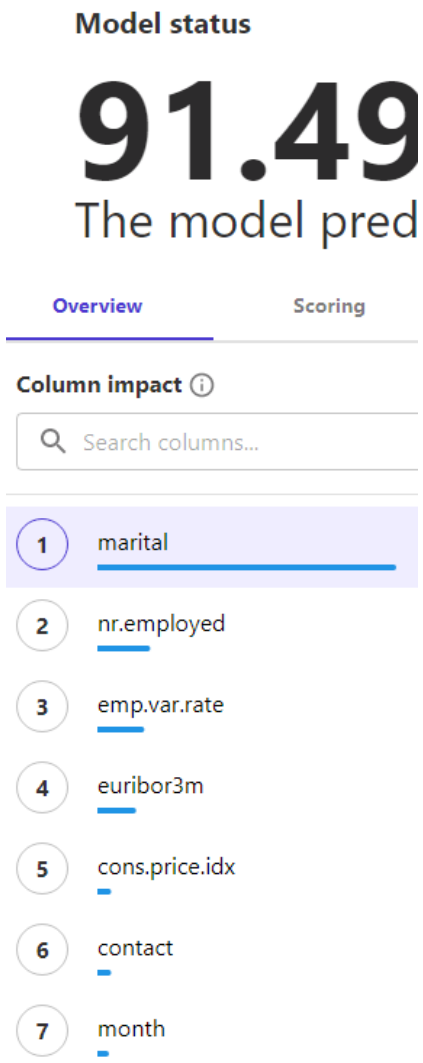
- After selecting the **Target column**, start building your model.



- You can check out the information on the building time and progress of your model by staying in the **Build** tab

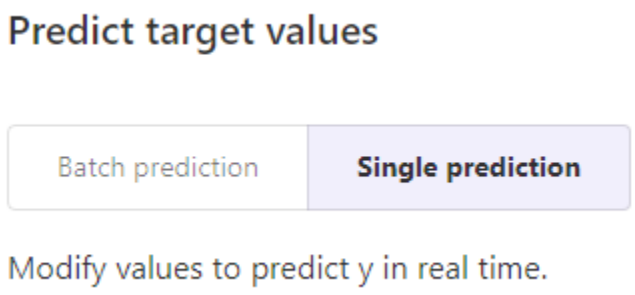
Analyzing your model

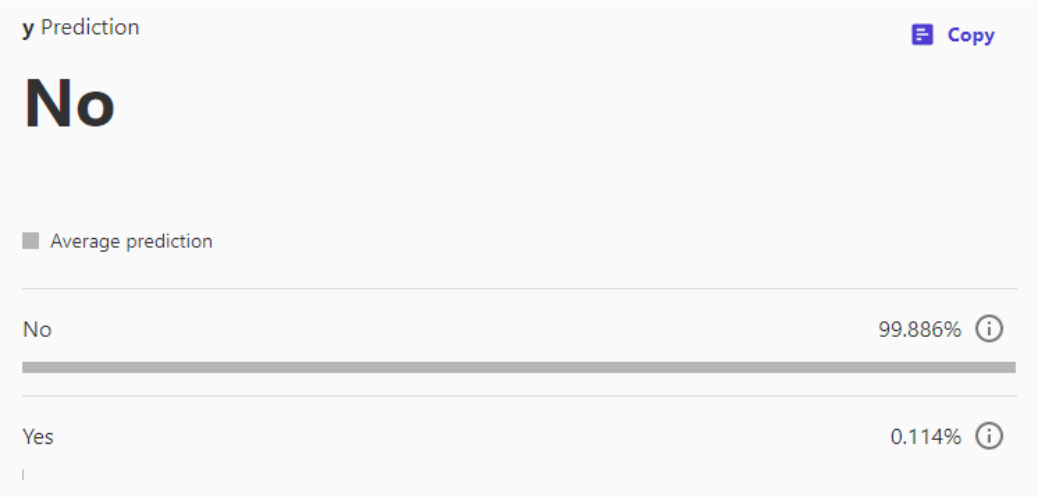
- After the model has been built, in the **Analyze** tab, check which column has the most impact on your predictions in the **Overview** section, and review how well your model has been built in the **Scoring** section.



Generate predictions

- In the **Prediction** tab, try to change the dataset values to see how the prediction results change in **Single** prediction. You can also import new datasets and generate predictions in **Batch** prediction.





When you start the following datasets are available to use

Amazon SageMaker
Canvas

Models

Datasets

Datasets

Data

Name	Source	Columns	Rows	Cells	Created	Status
canvas-sample-loans-part-2.csv	S3	5	1,000	5,000	11/13/2022 9:04 AM	Ready
canvas-sample-housing.csv	S3	10	1,000	10,000	11/13/2022 9:04 AM	Ready
canvas-sample-sales-forecasting.csv	S3	5	1,000	5,000	11/13/2022 9:04 AM	Ready
canvas-sample-loans-part-1.csv	S3	19	1,000	19,000	11/13/2022 9:04 AM	Ready
canvas-sample-maintenance.csv	S3	9	1,000	9,000	11/13/2022 9:04 AM	Ready
canvas-sample-shipping-logs.csv	S3	12	1,000	12,000	11/13/2022 9:04 AM	Ready
canvas-sample-product-descriptions.csv	S3	5	120	600	11/13/2022 9:04 AM	Ready
canvas-sample-diabetic-readmission.csv	S3	16	1,000	16,000	11/13/2022 9:04 AM	Ready

Click on Join data set and import sample loans part 1 and 2

- You can use loan sample data set to predict whether a customer will repay a loan. Use the **loan_status** column as the target column
- The data source is https://www.kaggle.com/datasets/wordsforthewise/lending-club

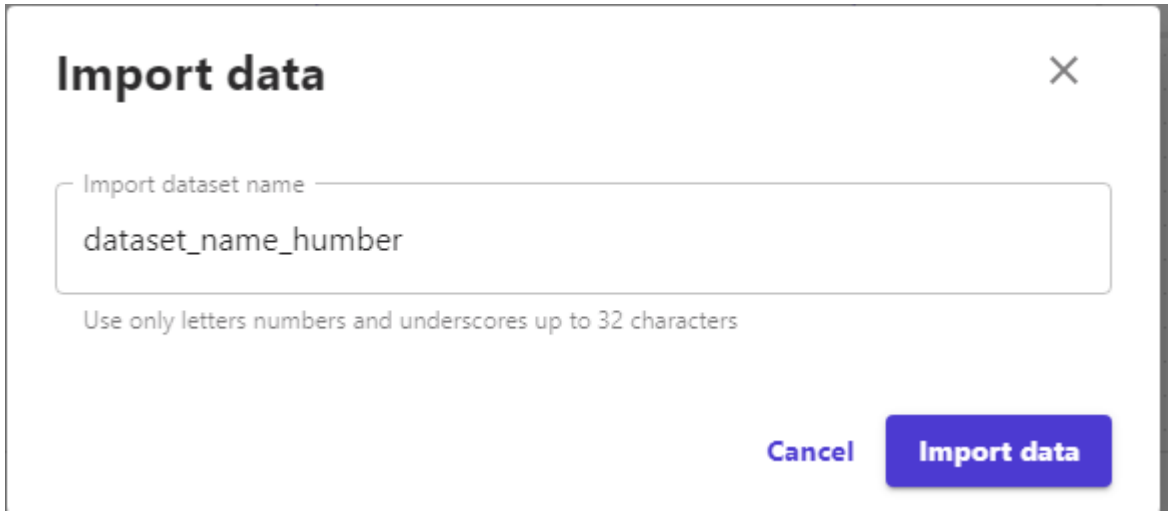
☐	canvas-sample-sales-forecasting.csv	S3	5	1,000	5,000	03/12/2023 2:32 PM	Ready
☑	canvas-sample-loans-part-1.csv	S3	19	1,000	19,000	03/12/2023 2:32 PM	Ready
☐	canvas-sample-housing.csv	S3	10	1,000	10,000	03/12/2023 2:32 PM	Ready
☐	canvas-sample-product-descriptions.csv	S3	5	120	600	03/12/2023 2:32 PM	Ready
☐	canvas-sample-shipping-logs.csv	S3	12	1,000	12,000	03/12/2023 2:32 PM	Ready
☑	canvas-sample-loans-part-2.csv	S3	5	1,000	5,000	03/12/2023 2:32 PM	Ready
☐	canvas-sample-diabetic-readmission.csv	S3	16	1,000	16,000	03/12/2023 2:32 PM	Ready
☐	canvas-sample-maintenance.csv	S3	9	1,000	9,000	03/12/2023 2:32 PM	Ready

Join them based on **id**

- After join you will see that the resulting table has all the columns

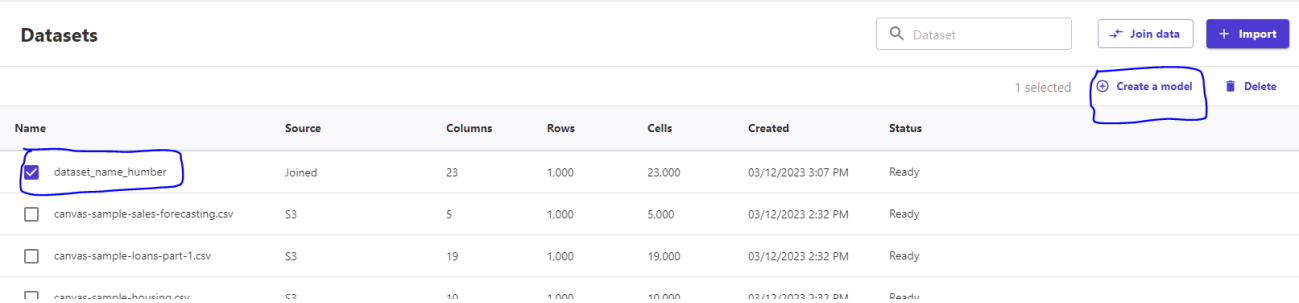
Import data and name it

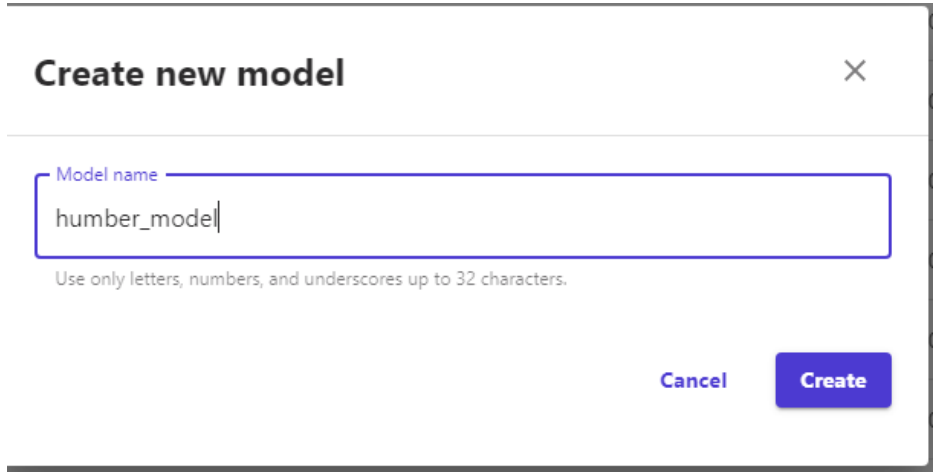
- After clicking on import, you need to set a **name** and click on **Import** data



Create model from that imported data

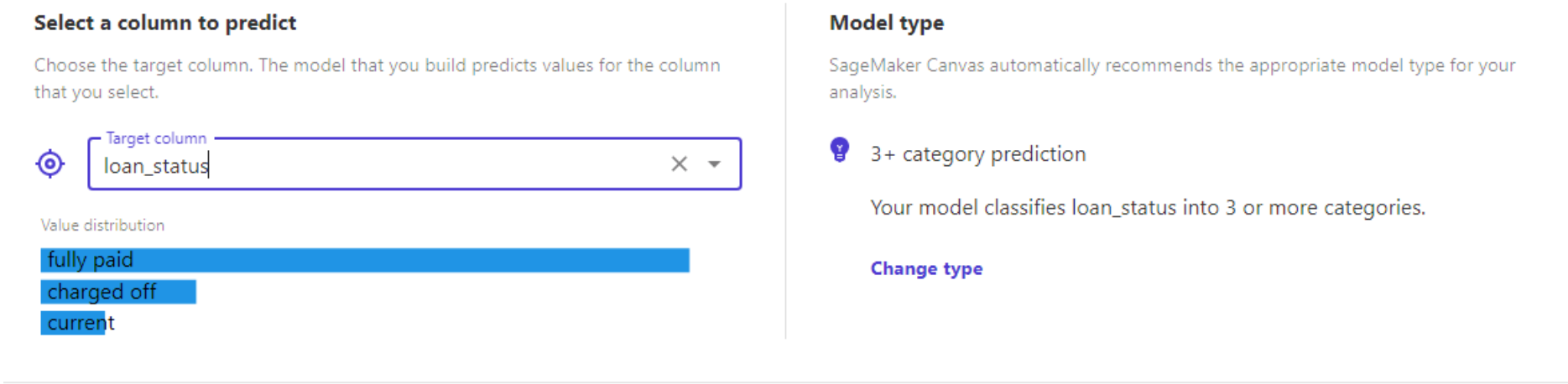
- Select the data
- Click on **create** model
- Set a **name** for the new model





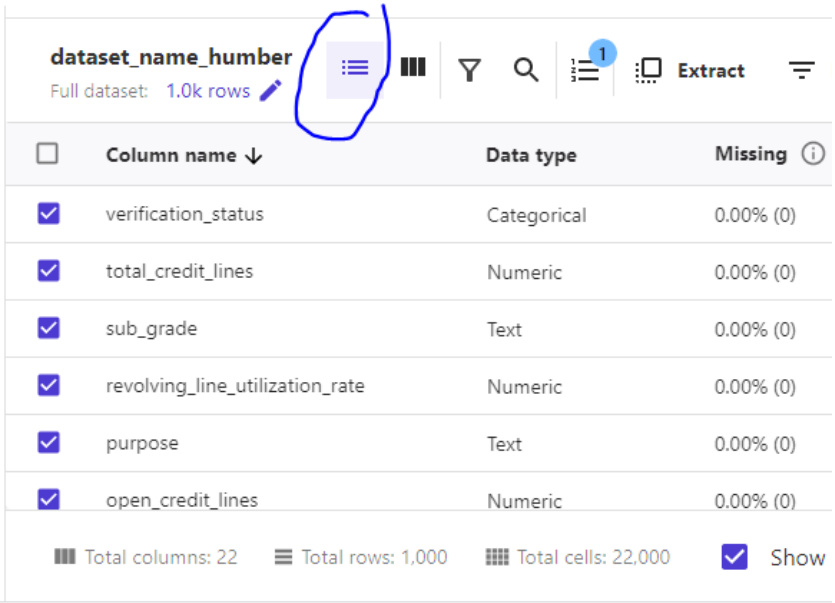
Select a column to predict

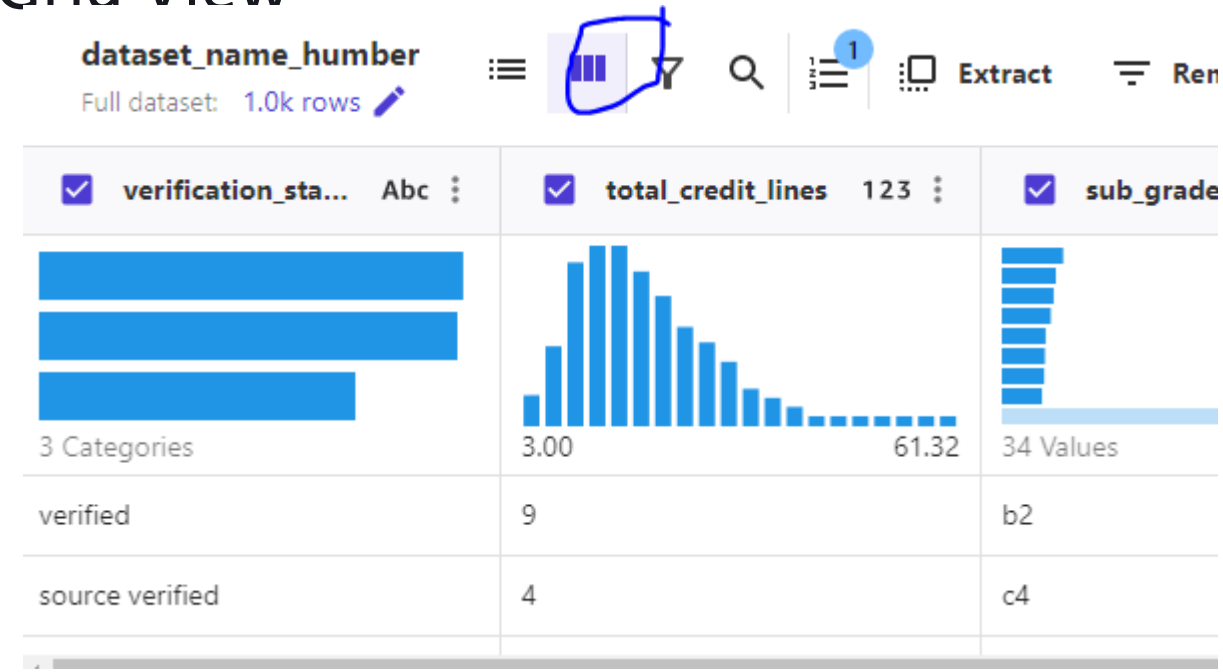
- Canvas will automatically detect that this is a **3+ category prediction** problem (also known as **multi-class classification**). If the wrong model type is detected, you can change it manually with the **Change type** link at the center of the screen.



Statistics about data

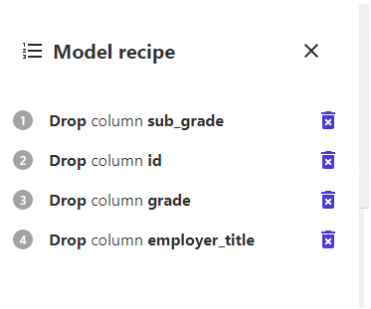
- At the bottom half of the screen, you can take a look at some of the statistics of the dataset, including missing and mismatched values, unique vales, mean and median values.
- You can see Column view and Grid View





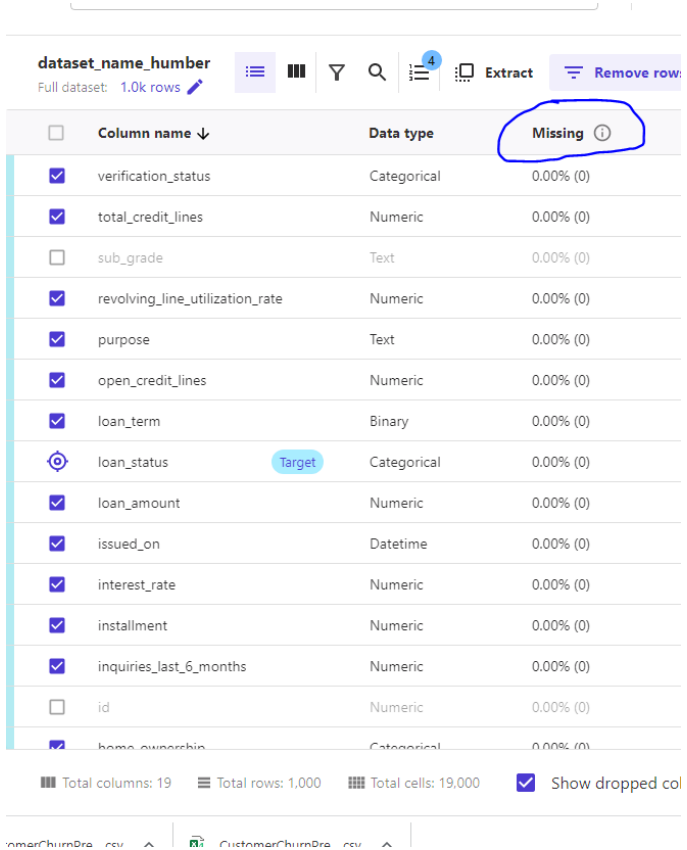
Drop columns

- You can also drop some of the columns, if we don't want to use them for the prediction, by simply **un-checking** them with the left checkbox.
- We deselect the columns that do not add value to the model training process:
- **id,** since it's a primary key, it does not have valuable information;
- **employer_title,**
- **Grade:** This number is something specific to the company that has shared this data set in Kaggle so we do not use it in this case
- **sub_grade:** Same as above



Missing values

- Dataset does not have a lot of missing values



dataset_name_humber
Full dataset: 1.0k rows

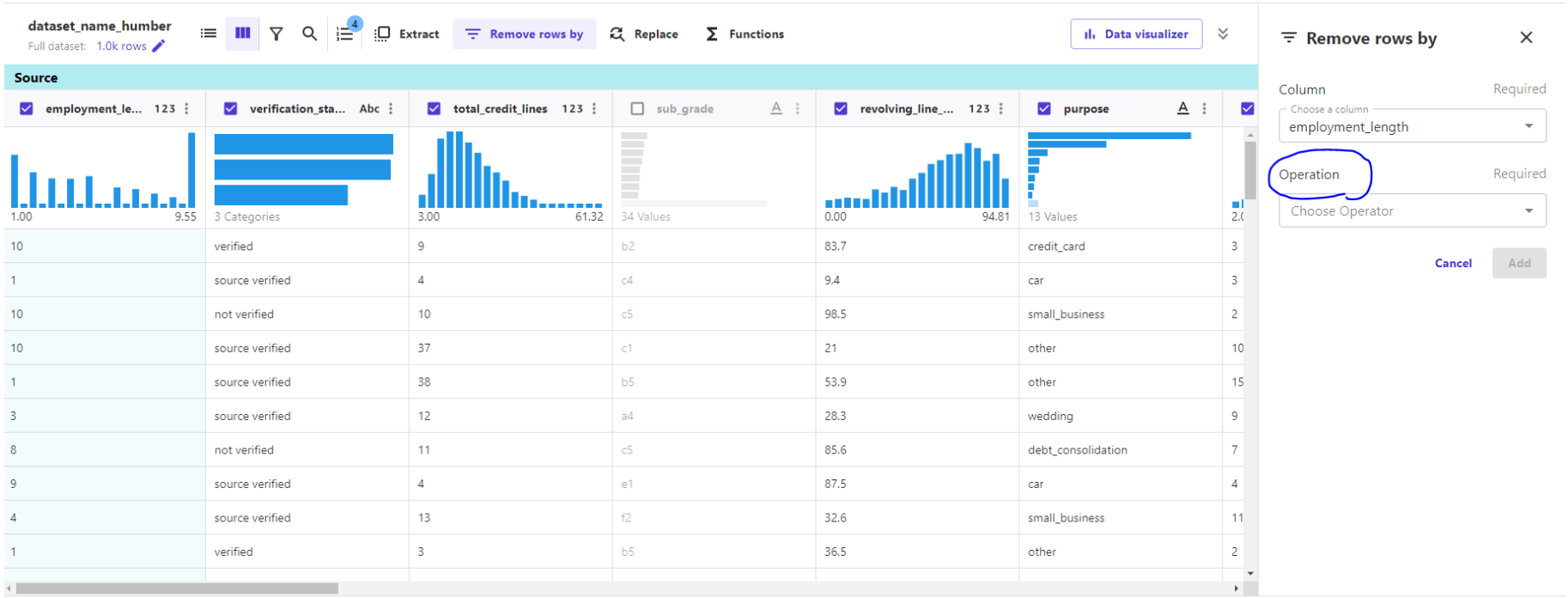
Extract | Remove row

Column name	Data type	Missing
verification_status	Categorical	0.00% (0)
total_credit_lines	Numeric	0.00% (0)
sub_grade	Text	0.00% (0)
revolving_line_utilization_rate	Numeric	0.00% (0)
purpose	Text	0.00% (0)
open_credit_lines	Numeric	0.00% (0)
loan_term	Binary	0.00% (0)
loan_status (Target)	Categorical	0.00% (0)
loan_amount	Numeric	0.00% (0)
issued_on	Datetime	0.00% (0)
interest_rate	Numeric	0.00% (0)
installment	Numeric	0.00% (0)
inquiries_last_6_months	Numeric	0.00% (0)
id	Numeric	0.00% (0)

Total columns: 19 | Total rows: 1,000 | Total cells: 19,000 | Show dropped col

We can remove the rows with missing values

- We do not have to handle missing values since our data does not have one.
- But if you needed to handle those, you can filter the missing values

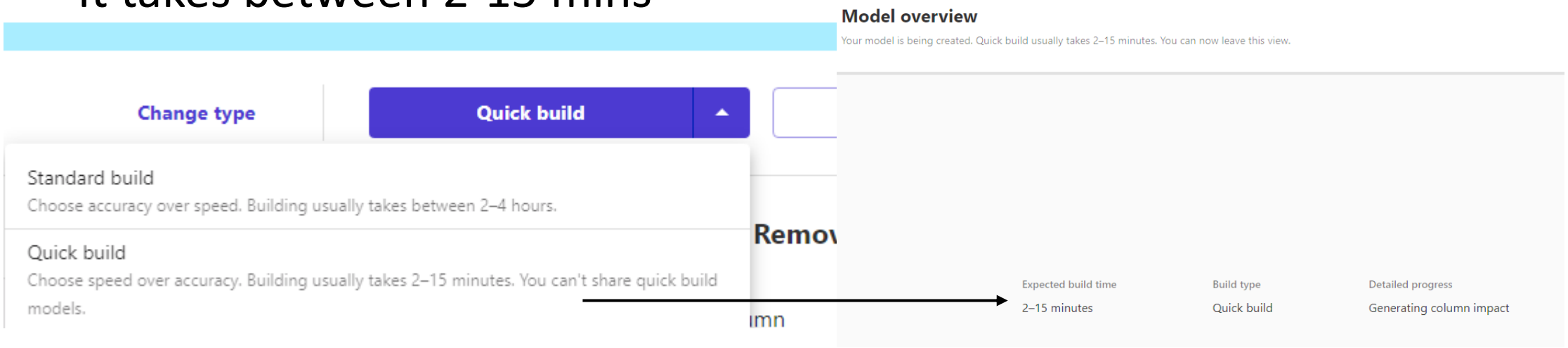


Quick Build Features

- Once you've explored this section, it's time to finally train the model!
- Before building a complete model, it is a good practice to have a general idea about the performances that our model will have by training a **Quick Build**.
- A quick model trains **fewer combinations of models** and **hyper-parameters** in order to prioritize speed over accuracy
- Note that quick build is not available for models bigger than 50k rows. Let's go ahead and click **Quick build**.

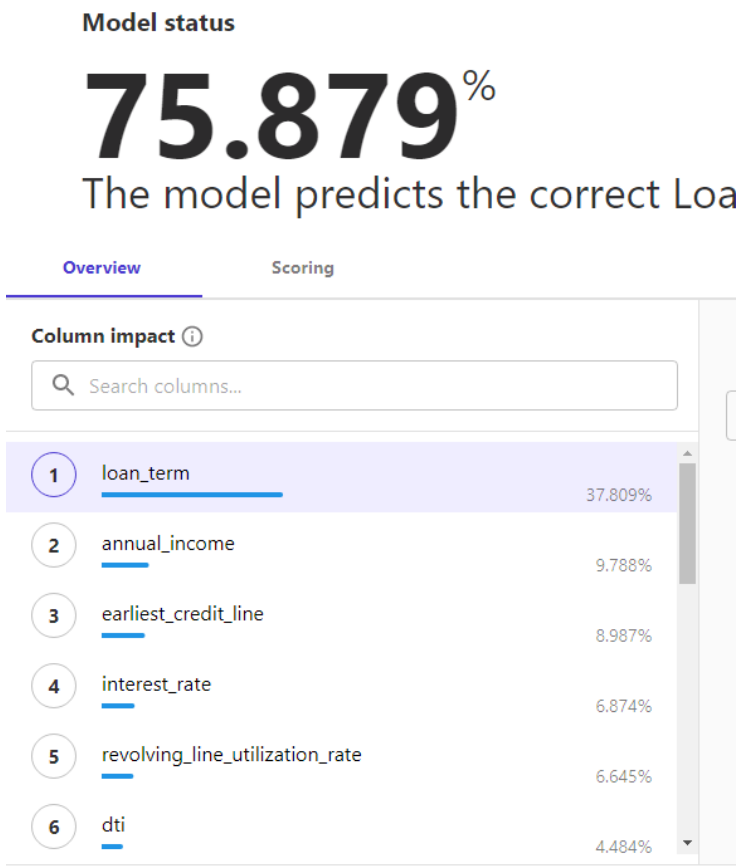
Select Quick Build

- It takes between 2-15 mins



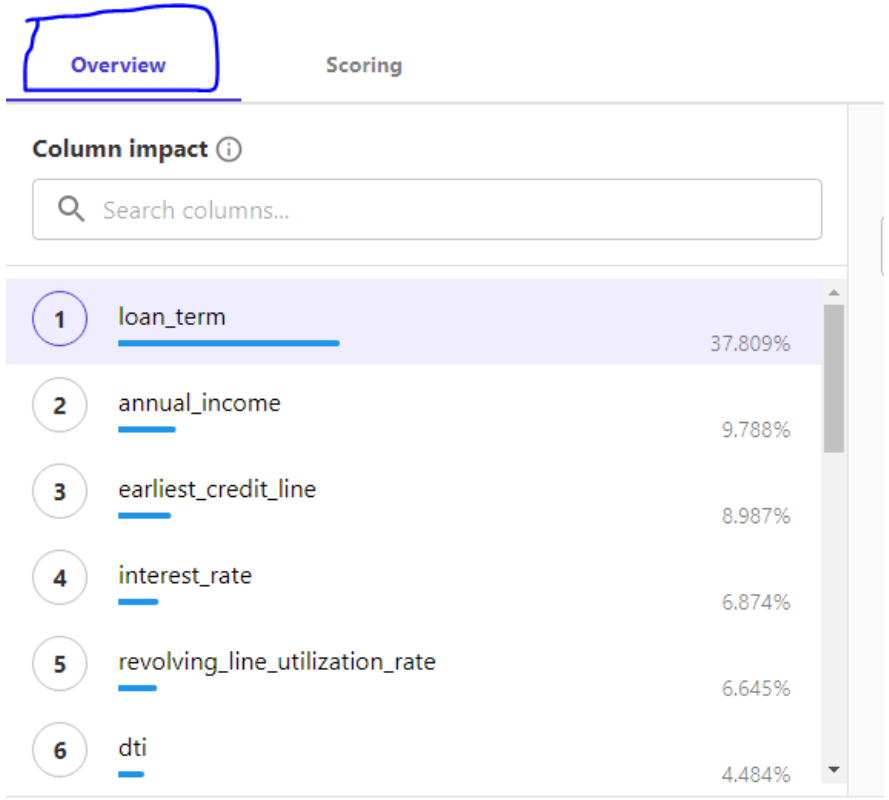
Analyze the model

- Once done, Canvas will automatically move to the **Analyze** tab, to show us the results of our quick training:



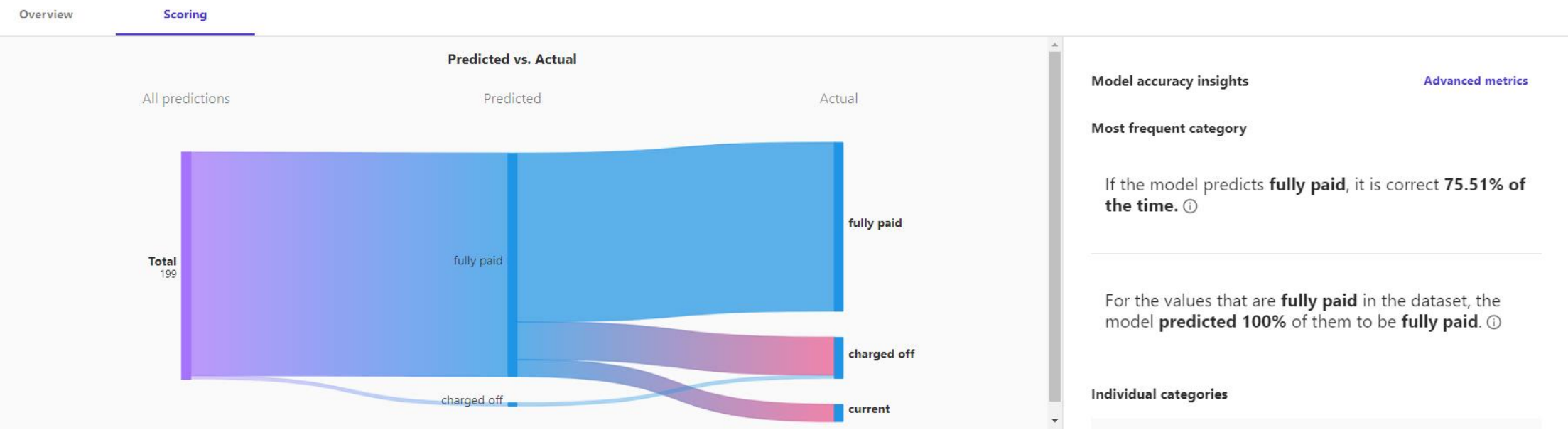
Column importance

- In the overview tab you see the column importance



Scoring

- On the scoring tab you see model metrics



Advanced Metrics

- You can get deeper quality metrics by going to the Advanced Metrics

Advanced metrics

Average f1	Average accuracy	Average precision	Average recall	Average AUC
33.81%	75.879%	58.503%	36.111%	Not available

Predicted values

Actual values	fully paid	charged off	current
fully paid	148	0	0
charged off	33	3	0
current	15	0	0

Class

fully paid

Precision
75.51%

Recall
100%

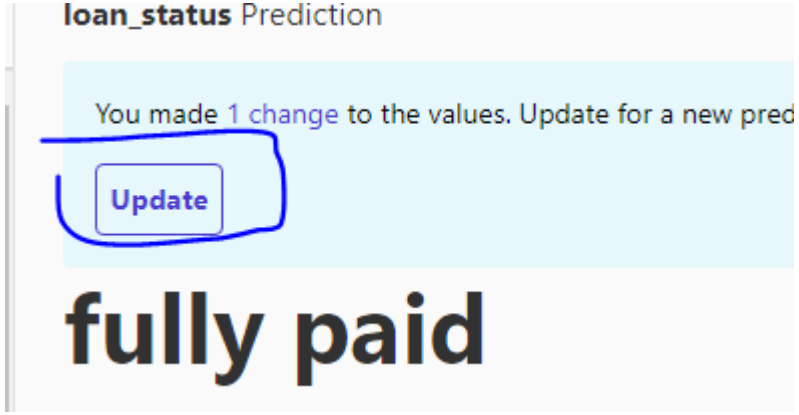
Accuracy
75.879%

F1
0.86

Auc
Not available

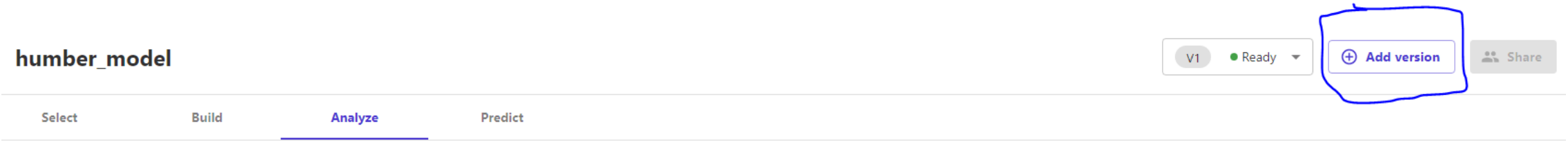
Predict

- Now that the model is trained, let's use for some predictions.
- Select **Predict** at the bottom of the **Analyze** page, or choose the **Predict** tab.
- Click on **Single Prediction**
- Put some numbers there just to simulate the prediction
- This is good for **what-if** scenarios
- Click on update to see the result



Add Version

- You can add a new version of this model and this time you train with Standard method



- The console says it take 2-4 hours to create the model but for me it took around **15** minutes

Compare scoring with quick build

Advanced metrics

Average f1	Average accuracy	Average precision	Average recall	Average AUC
34.494%	75.622%	58.714%	36.481%	Not available

Predicted values

Actual values	fully paid	charged off	current
fully paid	150	0	0
charged off	34	1	1
current	13	1	1

Class

fully paid

Precision
76.142%

Recall
100%

Accuracy
75.622%

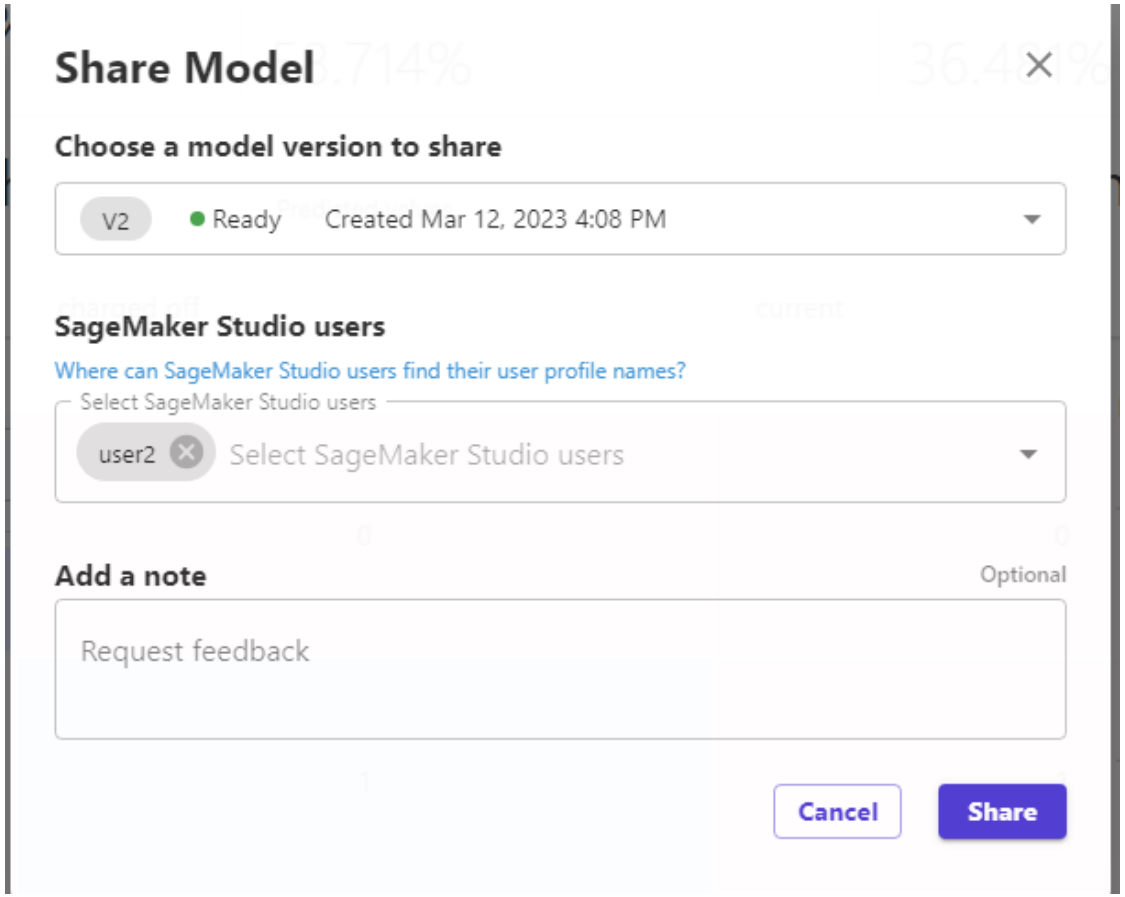
F1
0.865

Auc
Not available

Close Download

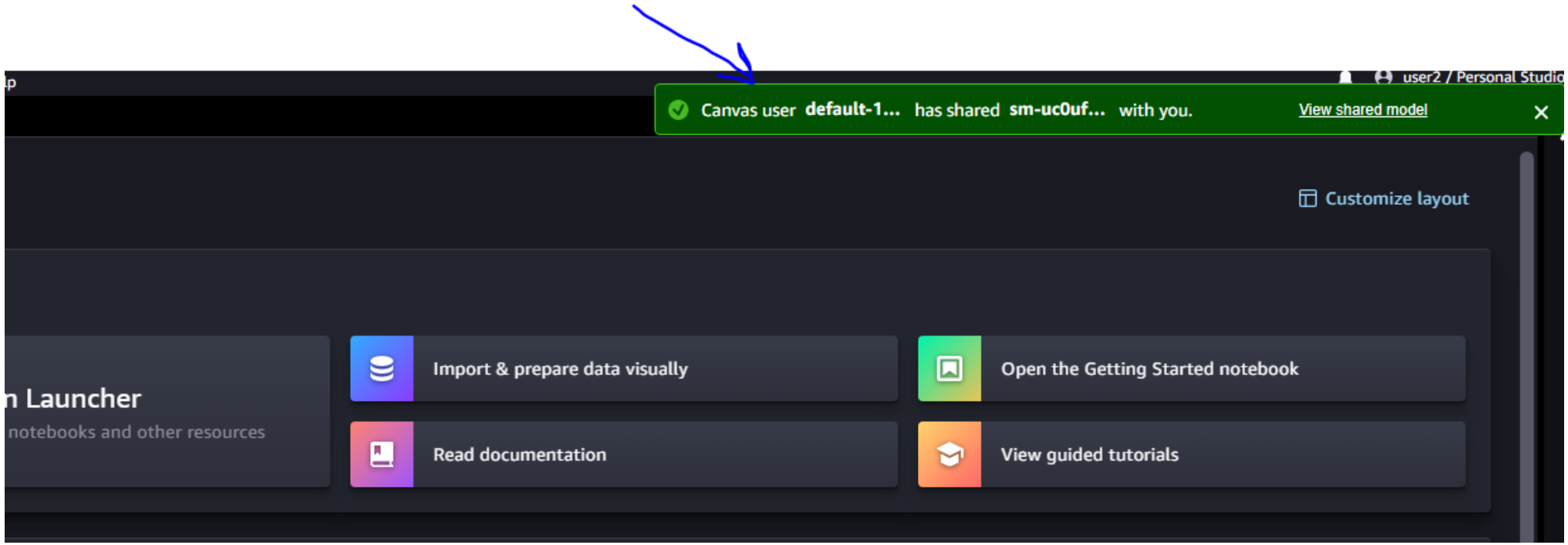
You can share that model

- Assume you have user 2 in that domain



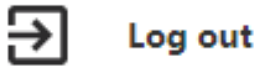
What user2 sees

- When user2 login to Studio a message is shown
- Click on view shared models
- You can deploy it by this user session



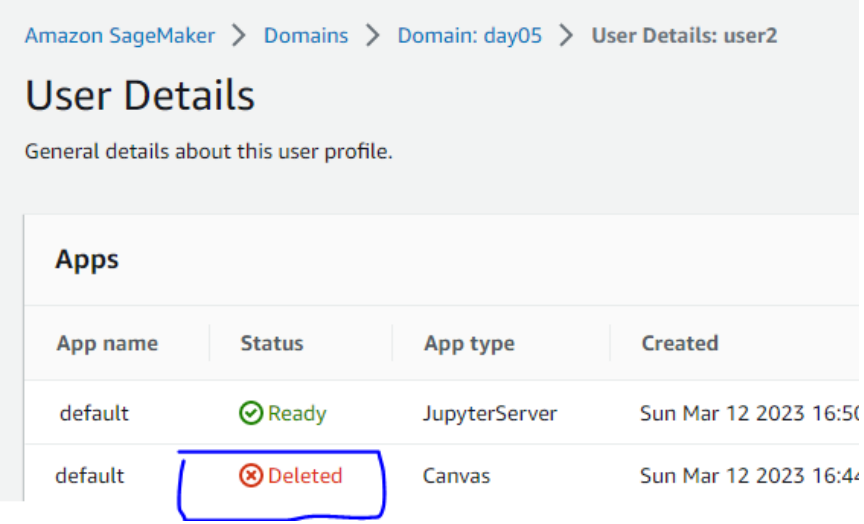
Important

- Billing in SageMaker Canvas consists of the following components:
  - **Session charges** – You are charged for the number of hours that you are logged in to or using SageMaker Canvas.
  - **Training charges** – You are charged for training models based on the size of the dataset you use.
- Make sure you follow below instructions to avoid unnecessary cost:
  - If you're not using Amazon SageMaker Canvas, you can log out of your session. A *session* starts as soon as you launch SageMaker Canvas from the console. Logging out ends the session. You are only billed for the duration of the session.
  - When you log out, your models and datasets aren't affected, but SageMaker Canvas cancels any **Quick build** tasks. If you log out of SageMaker Canvas while running a **Quick build**, your build might be interrupted until you log back in. When you log back in, SageMaker Canvas automatically restarts the build.
  - Click on logout button now



Check if you have active session

- SageMaker console → Select domains → Select domain details → under user profile → select user profile name
- Under the Apps → find canvas → see App type column
- See the status → if it shows ready, that means there is an active session and you get charged. Make sure it is in the deleted mode



Assignment

- I have uploaded White Wine quality data set to BB in **archive.zip** file (source: https://www.kaggle.com/datasets/piyushagni5/white-wine-quality)
- Create a report and explain the following actions:
  - Divide the data set to training and test set
  - Add the data set to SageMaker Canvas
  - Select the columns that you think add value in prediction
  - Build the model using quick build
  - Check accuracy when the columns are added or removed
  - Predict values using test data set
  - Create different versions
  - Try standard build and share with other studio users