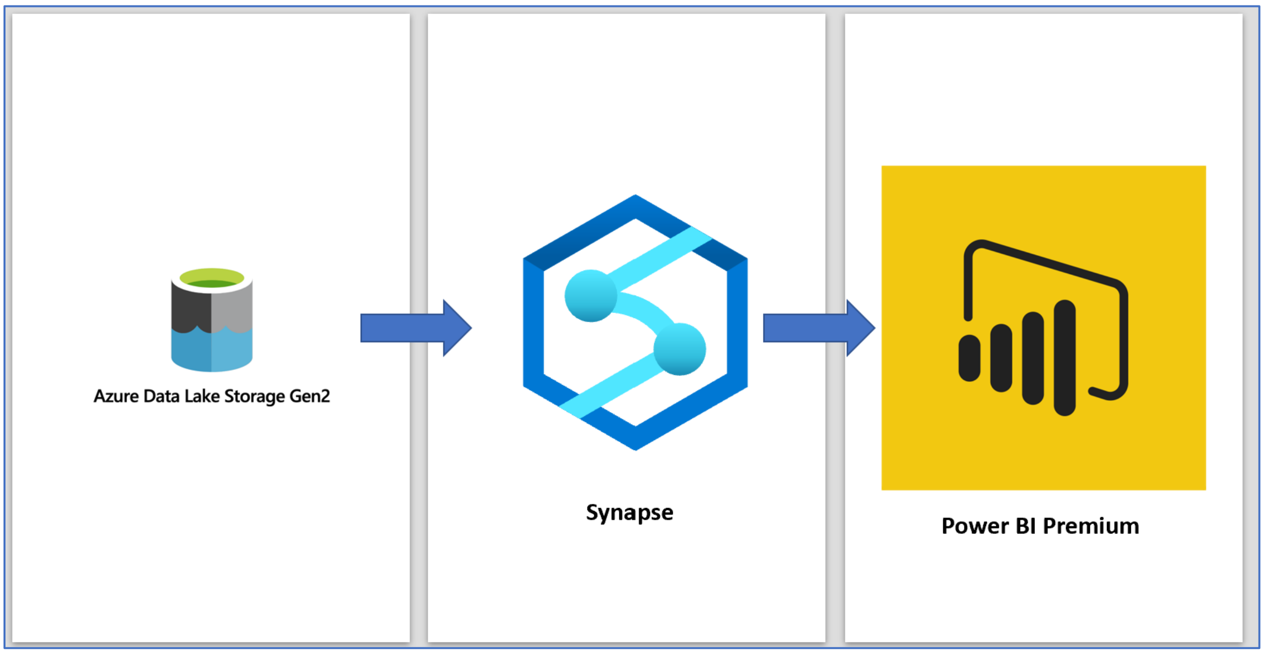
Tutorial: Create an AI/ML Model with Power BI Premium

In this tutorial, you learn how to create a powerful Classification Model without writing a single line of code using automated machine learning functionality provided within Power BI Premium. In our example, we will use an Accounts Receivable dataset and leverage Power BI premium to build a Classification Model that predicts if a customer will pay his/her account on time (i.e. before or on the invoice due date). Optionally – we could also run a Regression Model and predict when the customer will pay (i.e. the actual number of days it will take a customer will pay).

In this scenario, we have an Accounts Receivable dataset that resides in Azure Data Lake and can be queried with Azure Synapse Serverless. At a high level, the architecture of the lab looks as follows:



Architecture Components:

1. Azure Data Lake
   - Infinitely scalable azure storage
2. Synapse
   - Infinitely scalable compute that can be leveraged in a serverless or dedicated capacity
3. Power BI Premium
   - Analytics Platform providing users the ability to create AI/ML models

With automated machine learning functionality within Power BI Premium, you can automate away time intensive tasks of experimentation and testing ML models. Automated machine learning within Power BI Premium rapidly iterates over many combinations of algorithms and hyperparameters to help you find the best model based on a success metric of your choosing.

In this tutorial, you will go through the following high level tasks in order to complete the exercise end to end:

a) Login to powerbi.com and create a PowerBI Dataflow in your HackathonXX (XX denotes your hackathon # - i.e. Hackathon1, Hackathon2,and so on and so forth)
b) Go into the Power BI Dataflow created above and create a Machine Learning Model.
c) Review the Model Validation report.
d) Apply the model and see the predicted values on your dataflow dataset

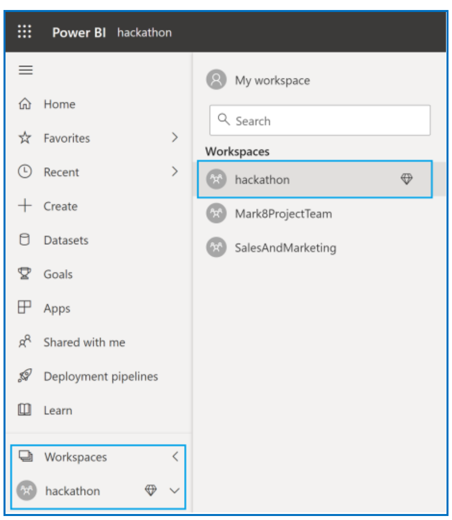
A) Login to Power BI and Create Dataflow

Login to *app.powerbi.com* using your credentials provided but should follow the format:

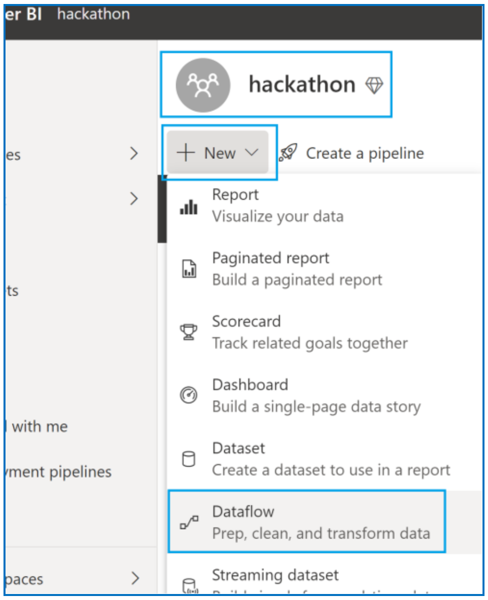
Username:

Password:

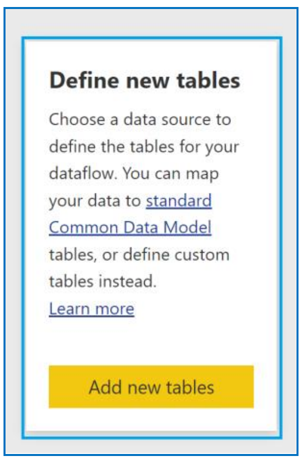
Go to your Hackathon workspace as shown below:



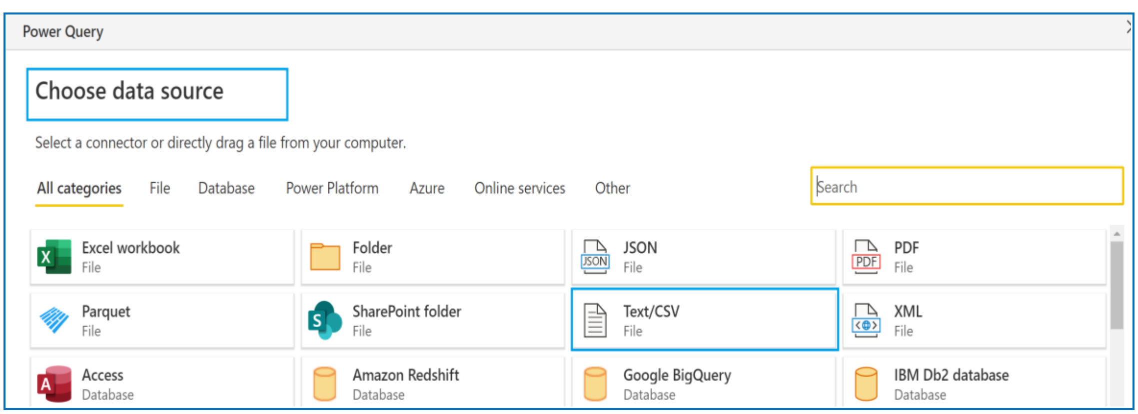
Create a Dataflow as by clicking on the + New button as shown:



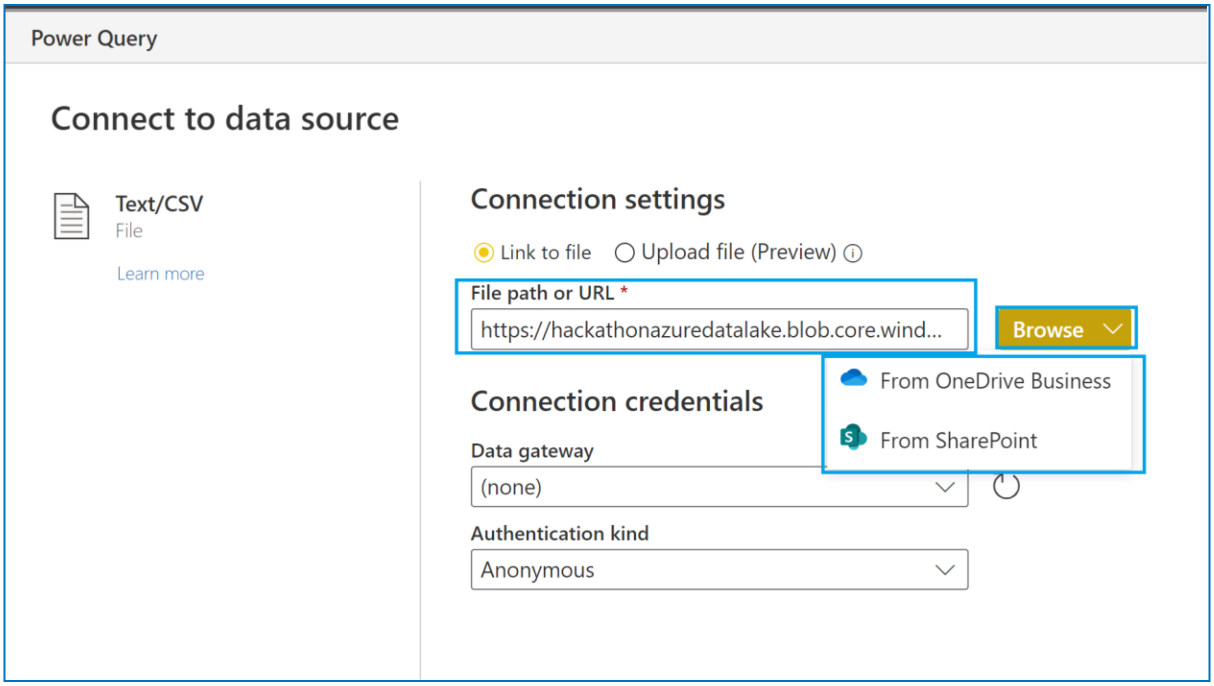
Click on Define New Tables:

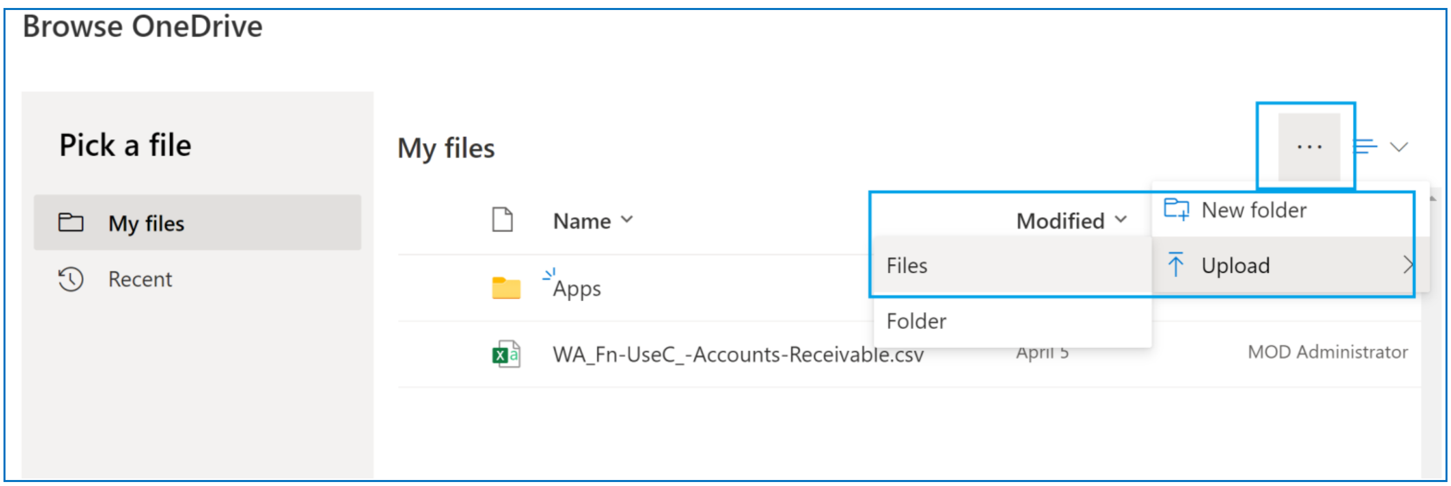


Choose a Data Source -> Text/CSV(didn't work)



Use Azure Data Lake:



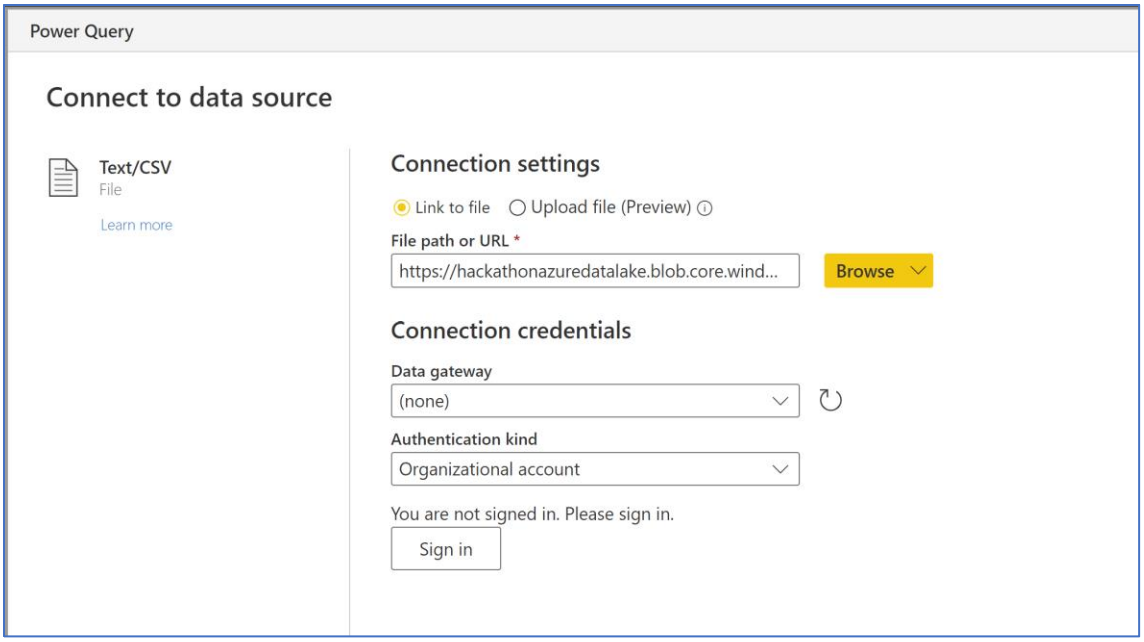


Click on Sign in – Organizational Account and enter your U/P (i.e. hacker@demotenant/password)

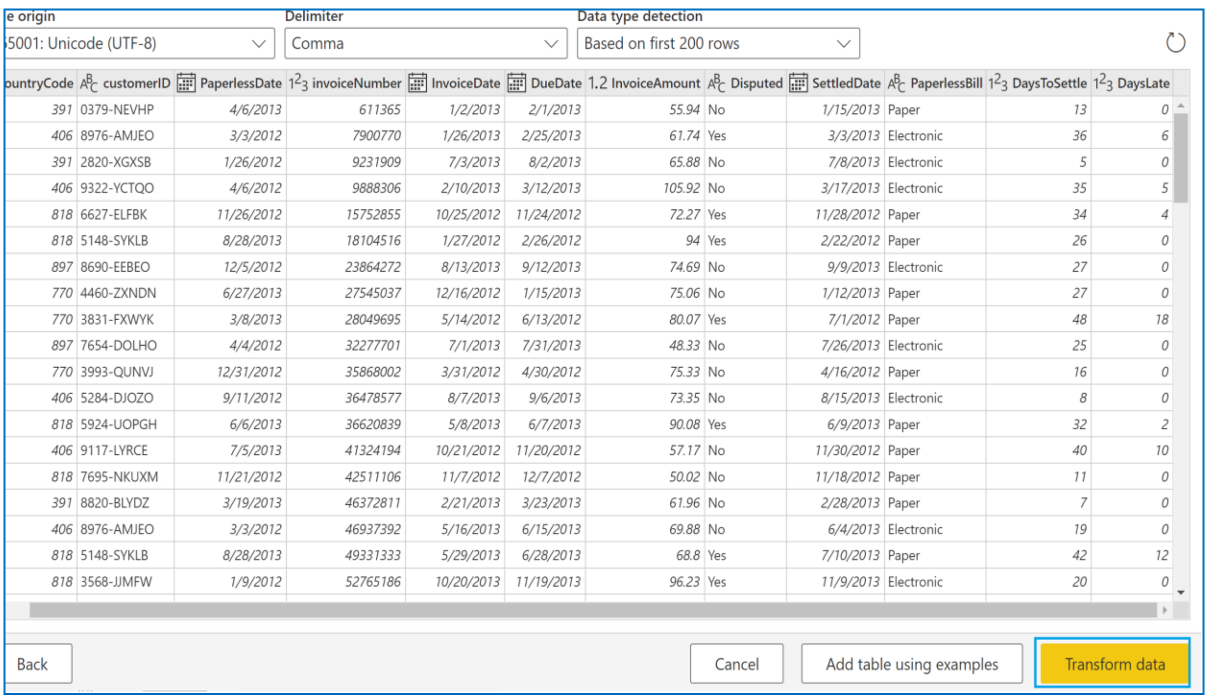
Data can be found on GitHub:

https://github.com/alpkayaMSFT/saponazureml/blob/main/WA_Fn-UseC_-Accounts-Receivable.csv

For File Path – Upload File (you can download the file locally and then upload)



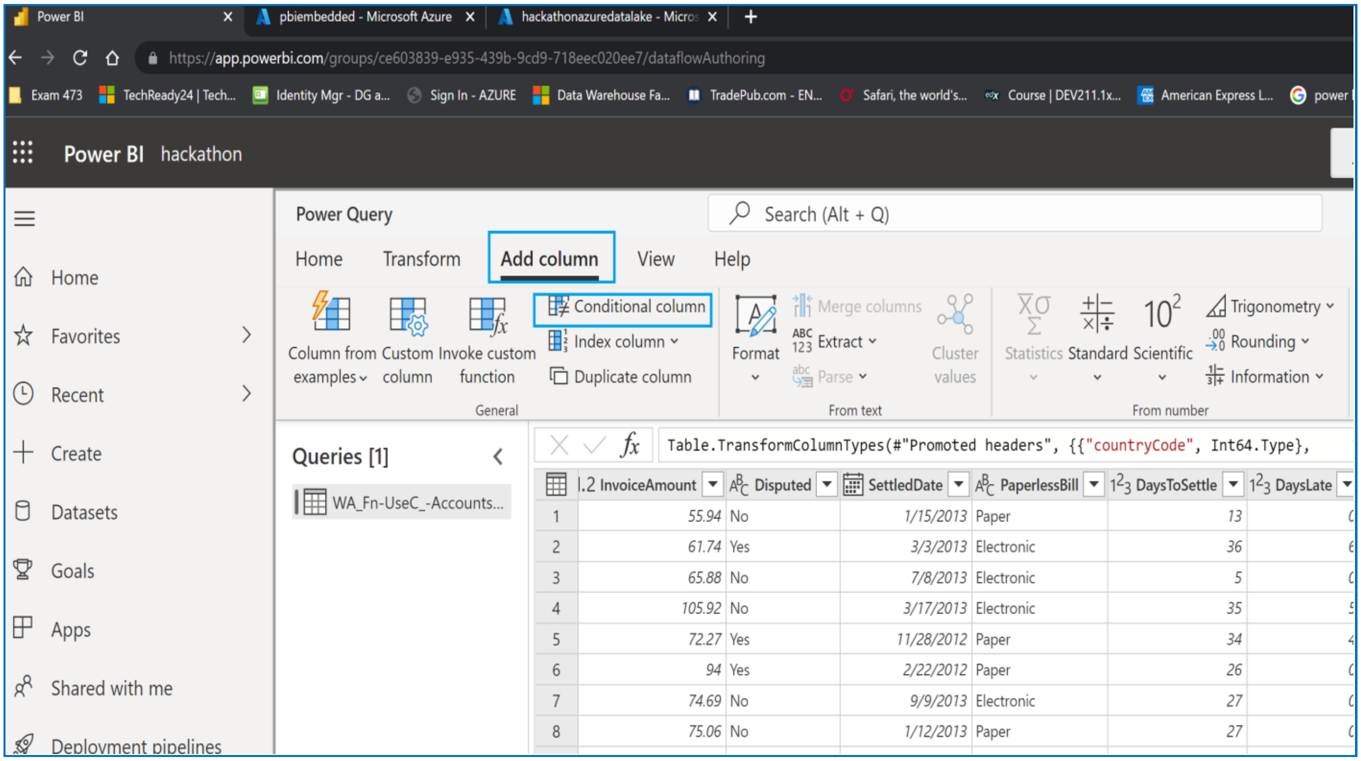
Click Next



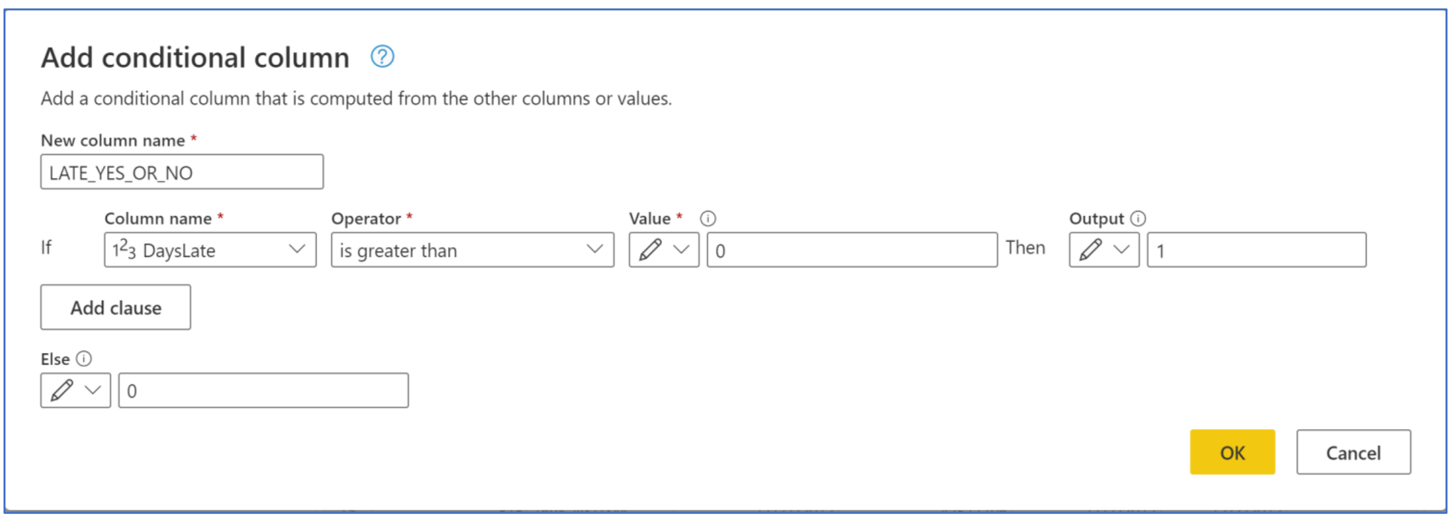
ountryCode	customerID	PaperlessDate	invoiceNumber	InvoiceDate	DueDate	InvoiceAmount	Disputed	SettledDate	PaperlessBill	DaysToSettle	DaysLate
391	0379-NEVHP	4/6/2013	611365	1/2/2013	2/1/2013	55.94	No	1/15/2013	Paper	13	0
406	8976-AMJEO	3/3/2012	7900770	1/26/2013	2/25/2013	61.74	Yes	3/3/2013	Electronic	36	6
391	2820-XGXSB	1/26/2012	9231909	7/3/2013	8/2/2013	65.88	No	7/8/2013	Electronic	5	0
406	9322-YCTQO	4/6/2012	9888306	2/10/2013	3/12/2013	105.92	No	3/17/2013	Electronic	35	5
818	6627-ELFBK	11/26/2012	15752855	10/25/2012	11/24/2012	72.27	Yes	11/28/2012	Paper	34	4
818	5148-SYKLB	8/28/2013	18104516	1/27/2012	2/26/2012	94	Yes	2/22/2012	Paper	26	0
897	8690-EEBEO	12/5/2012	23864272	8/13/2013	9/12/2013	74.69	No	9/9/2013	Electronic	27	0
770	4460-ZXNDN	6/27/2013	27545037	12/16/2012	1/15/2013	75.06	No	1/12/2013	Paper	27	0
770	3831-FXWYK	3/8/2013	28049695	5/14/2012	6/13/2012	80.07	Yes	7/1/2012	Paper	48	18
897	7654-DOLHO	4/4/2012	32277701	7/1/2013	7/31/2013	48.33	No	7/26/2013	Electronic	25	0
770	3993-QUNVJ	12/31/2012	35868002	3/31/2012	4/30/2012	75.33	No	4/16/2012	Paper	16	0
406	5284-DJOZO	9/11/2012	36478577	8/7/2013	9/6/2013	73.35	No	8/15/2013	Electronic	8	0
818	5924-UOPGH	6/6/2013	36620839	5/8/2013	6/7/2013	90.08	Yes	6/9/2013	Paper	32	2
406	9117-LYRCE	7/5/2013	41324194	10/21/2012	11/20/2012	57.17	No	11/30/2012	Paper	40	10
818	7695-NKUXM	11/21/2012	42511106	11/7/2012	12/7/2012	50.02	No	11/18/2012	Paper	11	0
391	8820-BLYDZ	3/19/2013	46372811	2/21/2013	3/23/2013	61.96	No	2/28/2013	Paper	7	0
406	8976-AMJEO	3/3/2012	46937392	5/16/2013	6/15/2013	69.88	No	6/4/2013	Electronic	19	0
818	5148-SYKLB	8/28/2013	49331333	5/29/2013	6/28/2013	68.8	Yes	7/10/2013	Paper	42	12
818	3568-JJMFW	1/9/2012	52765186	10/20/2013	11/19/2013	96.23	Yes	11/9/2013	Electronic	20	0

Click on Transform data

Click on Add Column > Conditional Column



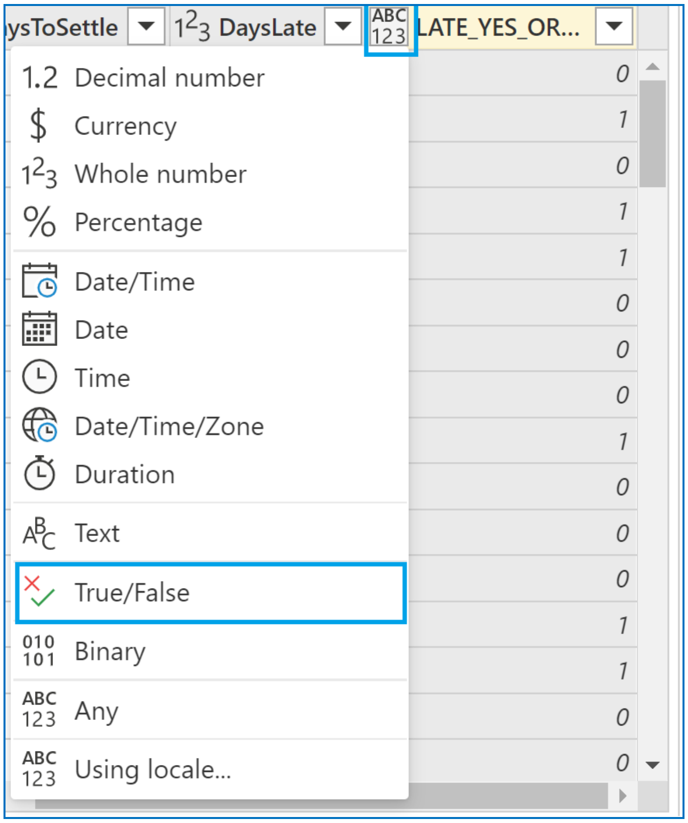
In the conditional column select Days Late > 0 is late (i.e. 1) otherwise 0 (i.e. not late). The logic should look as follows:



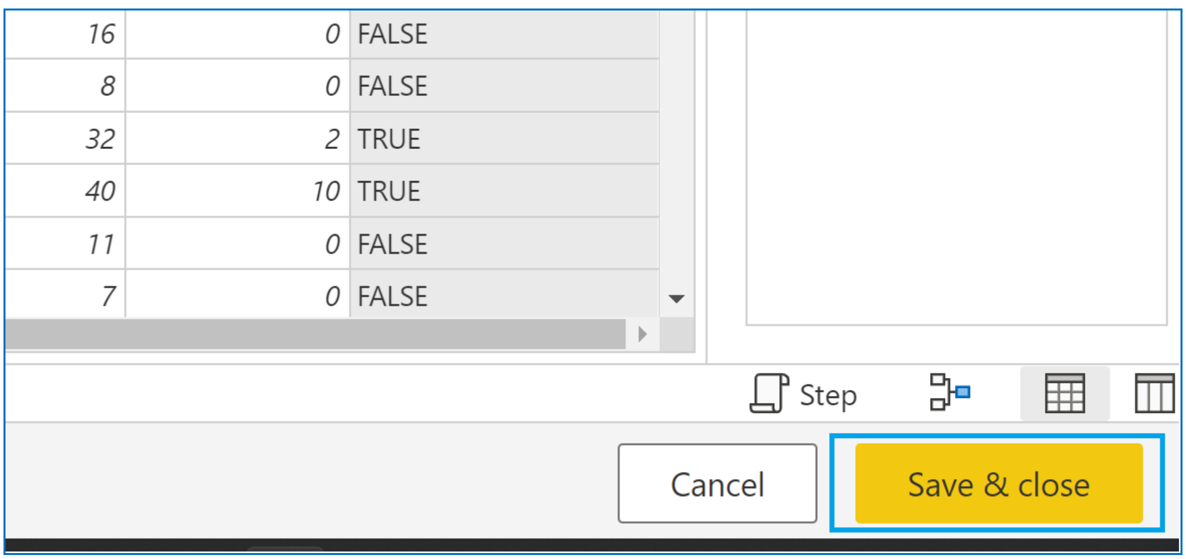
In PowerQuery it should look as follows:

```
Table.AddColumn(#"Changed column type", "LATE_YES_OR_NO", each if [DaysLate] > 0 then 1 else 0)
```

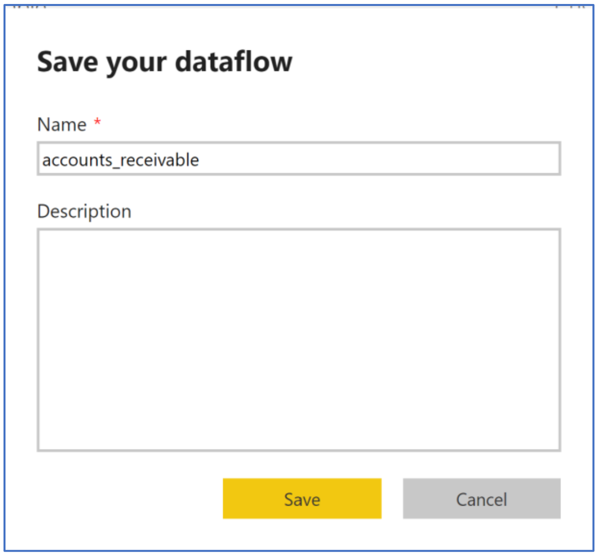
Click on the new conditional column you just created and change its datatype into Boolean (i.e. True/False)



Click Save & Close



Name your dataflow – in our example we used accounts_receivable and click Save



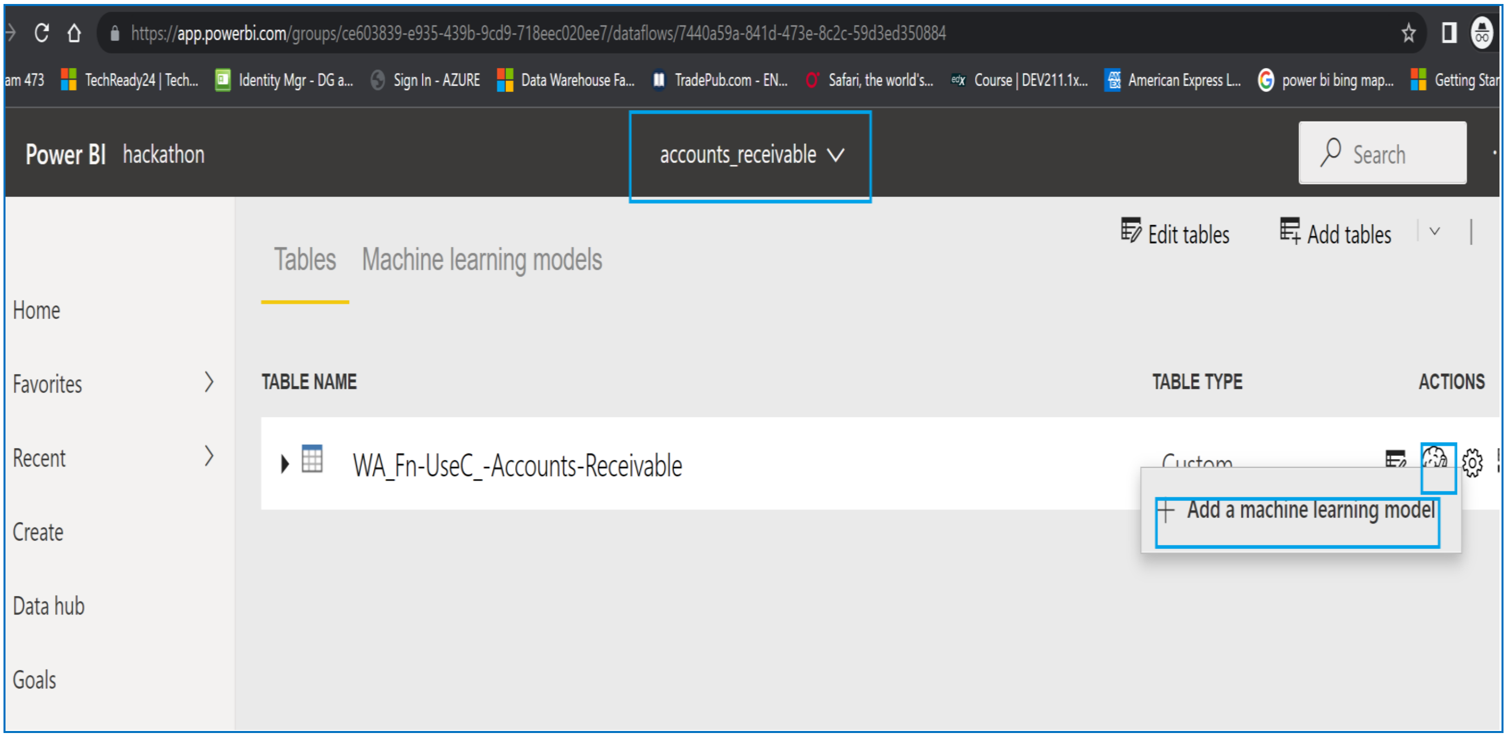
B) Create a Machine Learning Model

What does the Accounts Receivable Dataset Look like?

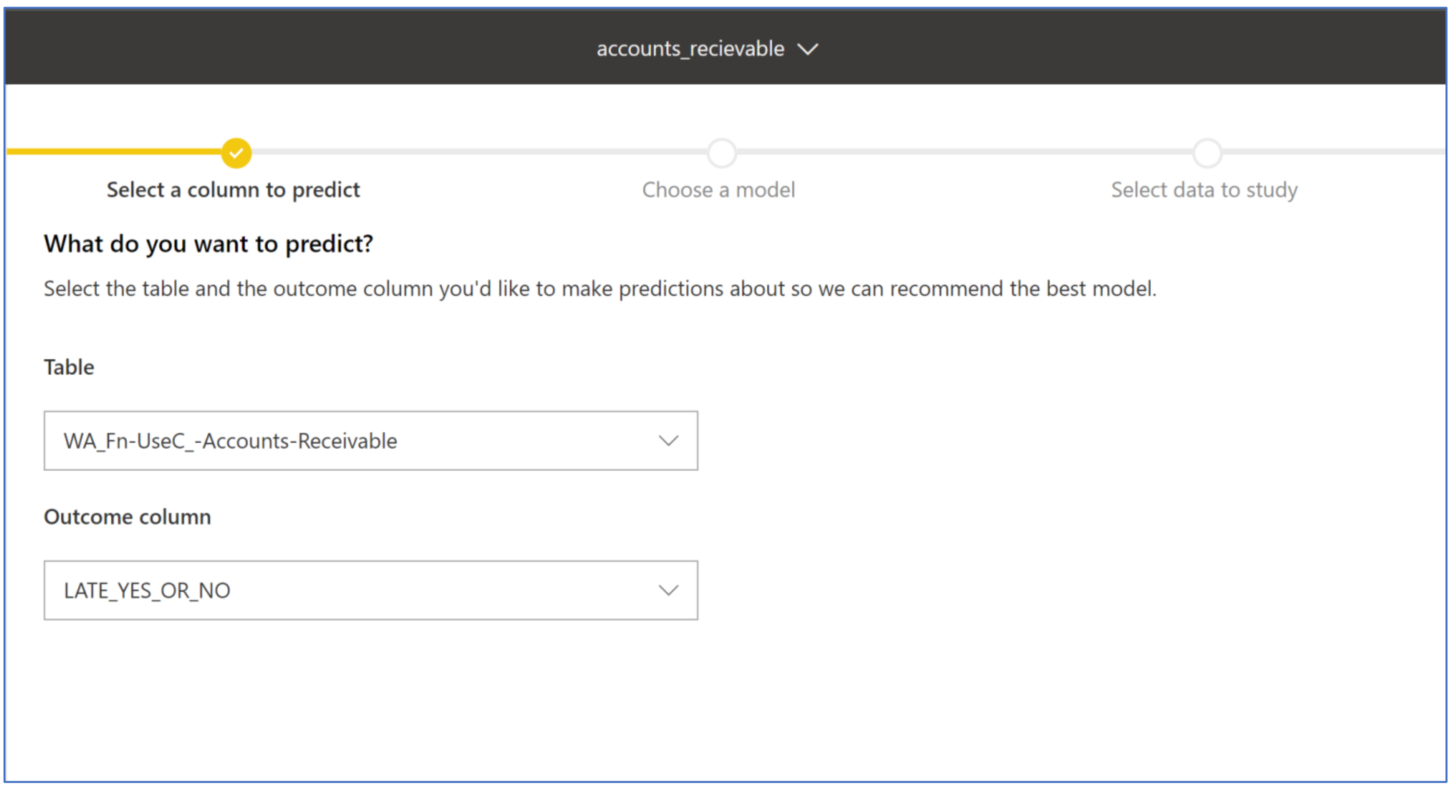
countryCode	customerID	PaperlessDate	invoiceNumber	InvoiceDate	DueDate	InvoiceAmount	Disputed	SettledDate	PaperlessBill	DaysToSettle	DaysLate	LateYorN
391	0187-ERLSR	7/31/2013	1756742390	9/5/2012	10/5/2012	84.57	No	9/14/2012	Paper	9	0	N
391	0187-ERLSR	7/31/2013	4037644863	3/29/2012	4/28/2012	62.68	Yes	4/25/2012	Paper	27	0	N
391	0187-ERLSR	7/31/2013	4063317759	9/22/2012	10/22/2012	65.26	Yes	10/11/2012	Paper	19	0	N
391	0187-ERLSR	7/31/2013	4160638076	2/16/2013	3/18/2013	56.5	Yes	3/2/2013	Paper	14	0	N
391	0187-ERLSR	7/31/2013	4814212537	3/22/2013	4/21/2013	86.92	No	3/27/2013	Paper	5	0	N

- CustomerID represents an ID for a customer
- InvoiceNumber is the number of the invoice for a customer
- InvoiceDate is the date that the customer was invoiced
- DueDate is the data that the bill is due (we are trying to predict if the customer will pay before/after this date)
- InvoiceAmount is the amount of the invoice

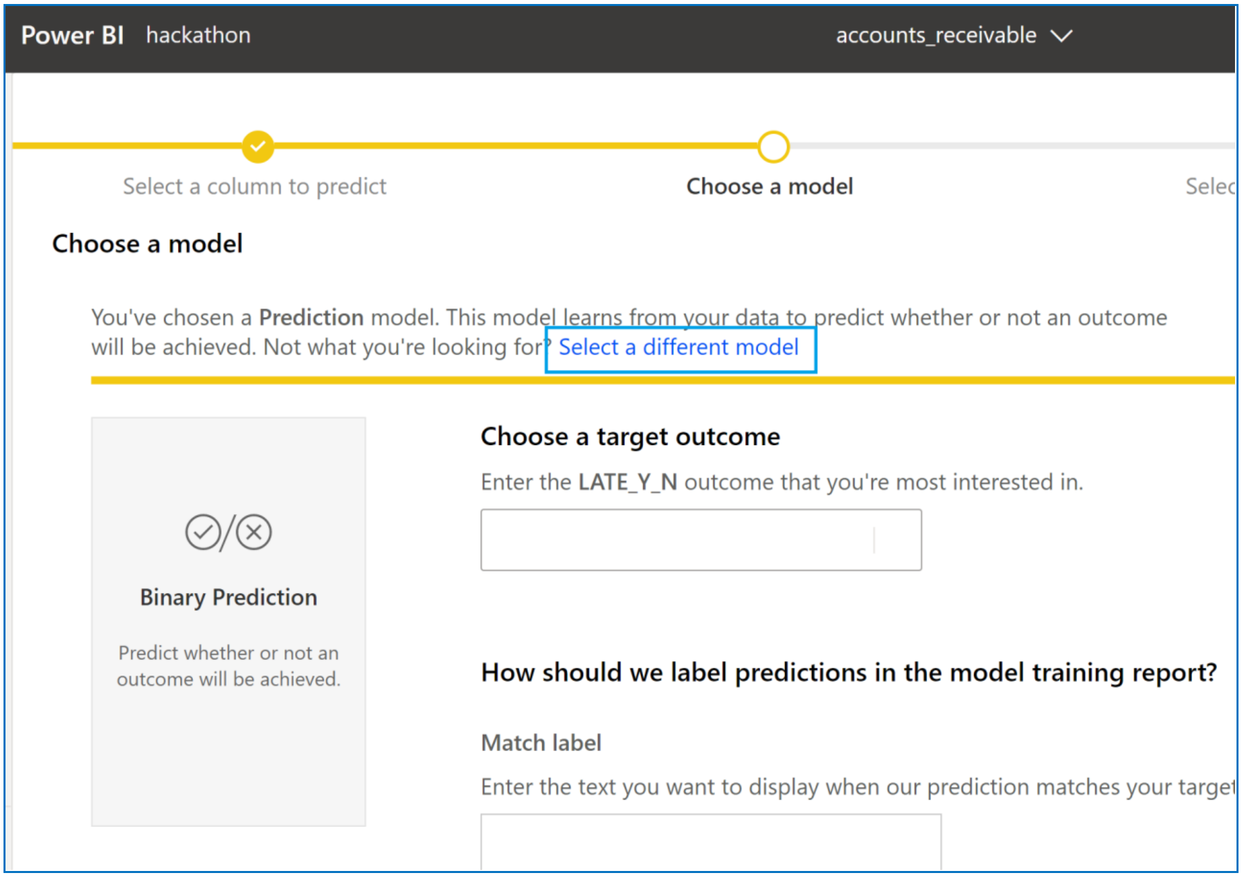
Click on the brain icon and "Add a machine learning model" as shown below



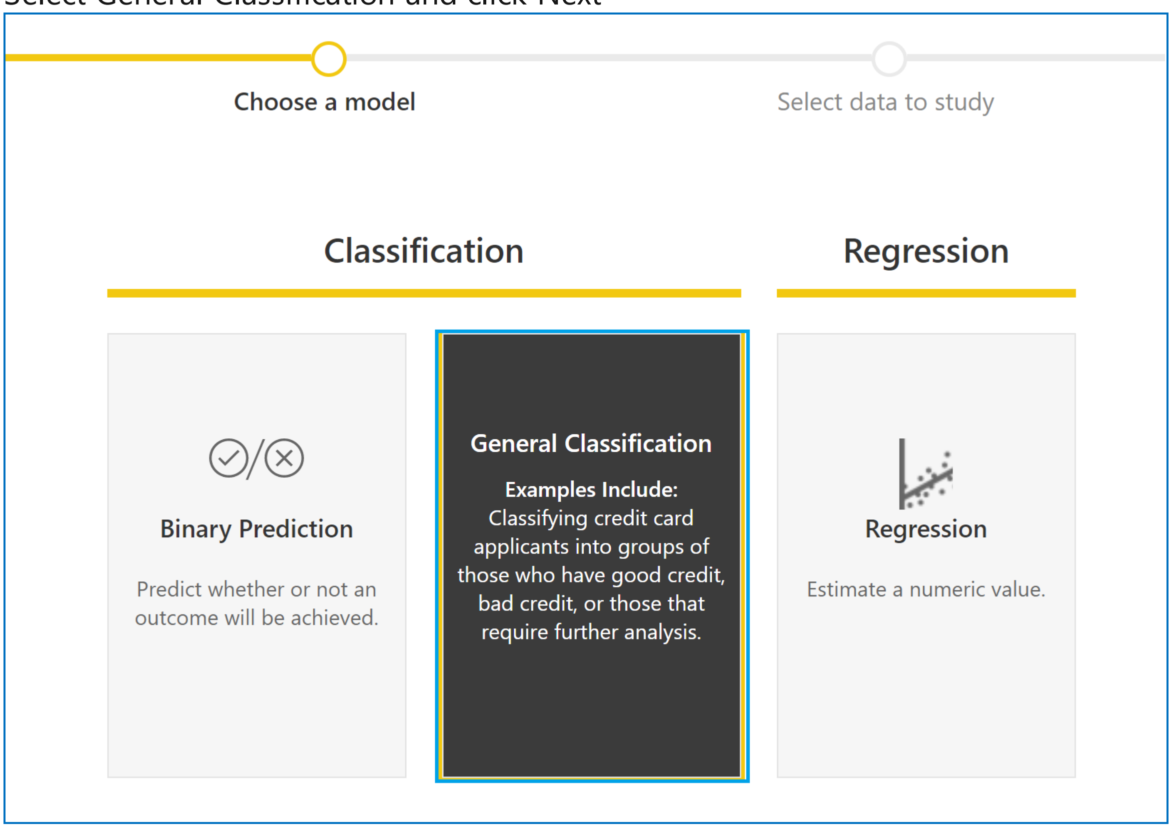
Select the table you created from the dataflow earlier – in our case it was "WA_Fn_UseC_Accounts-Receivable"

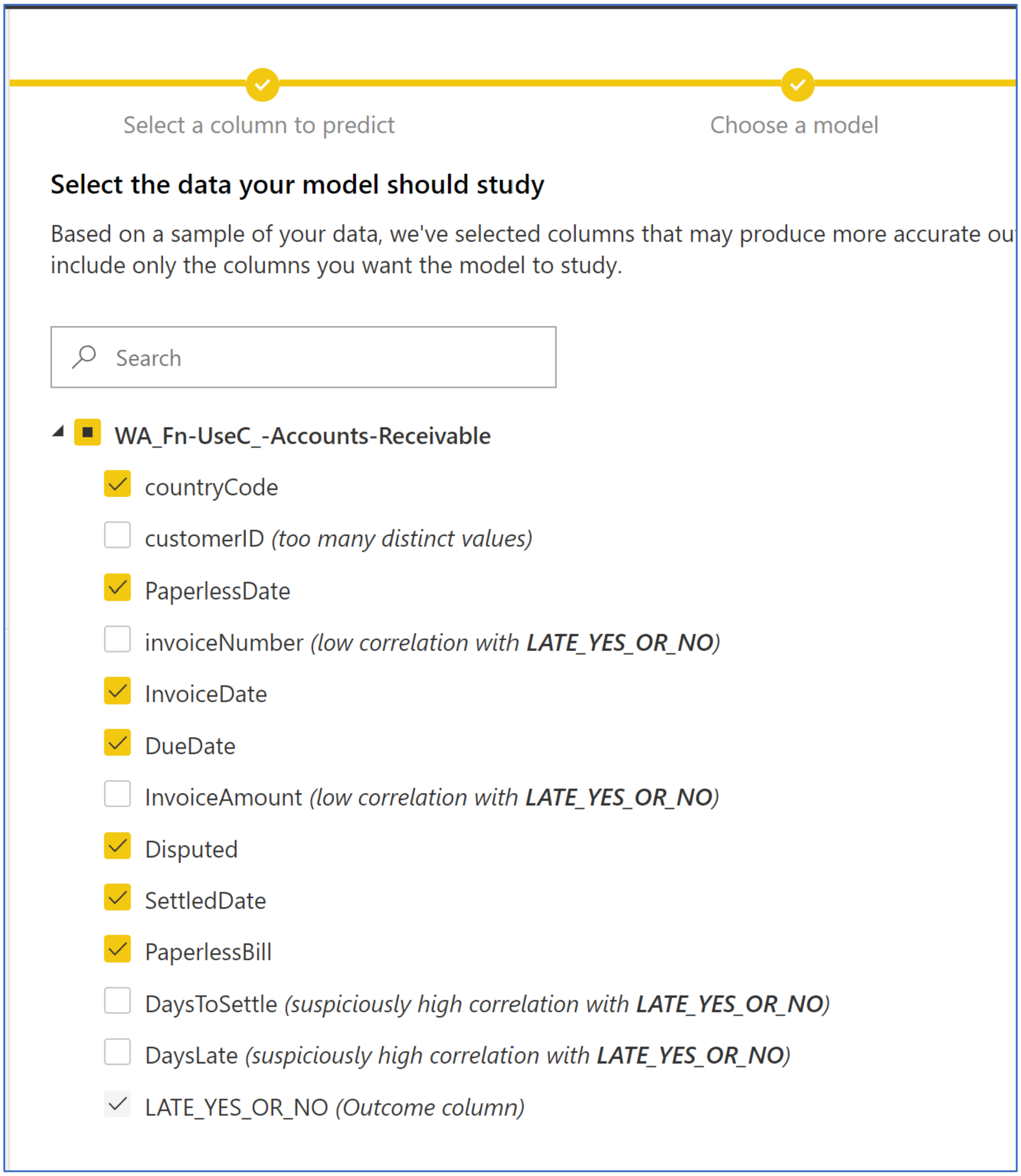


Click on “Select a different model” if the General Classification Model isn’t shown



Select General Classification and click Next

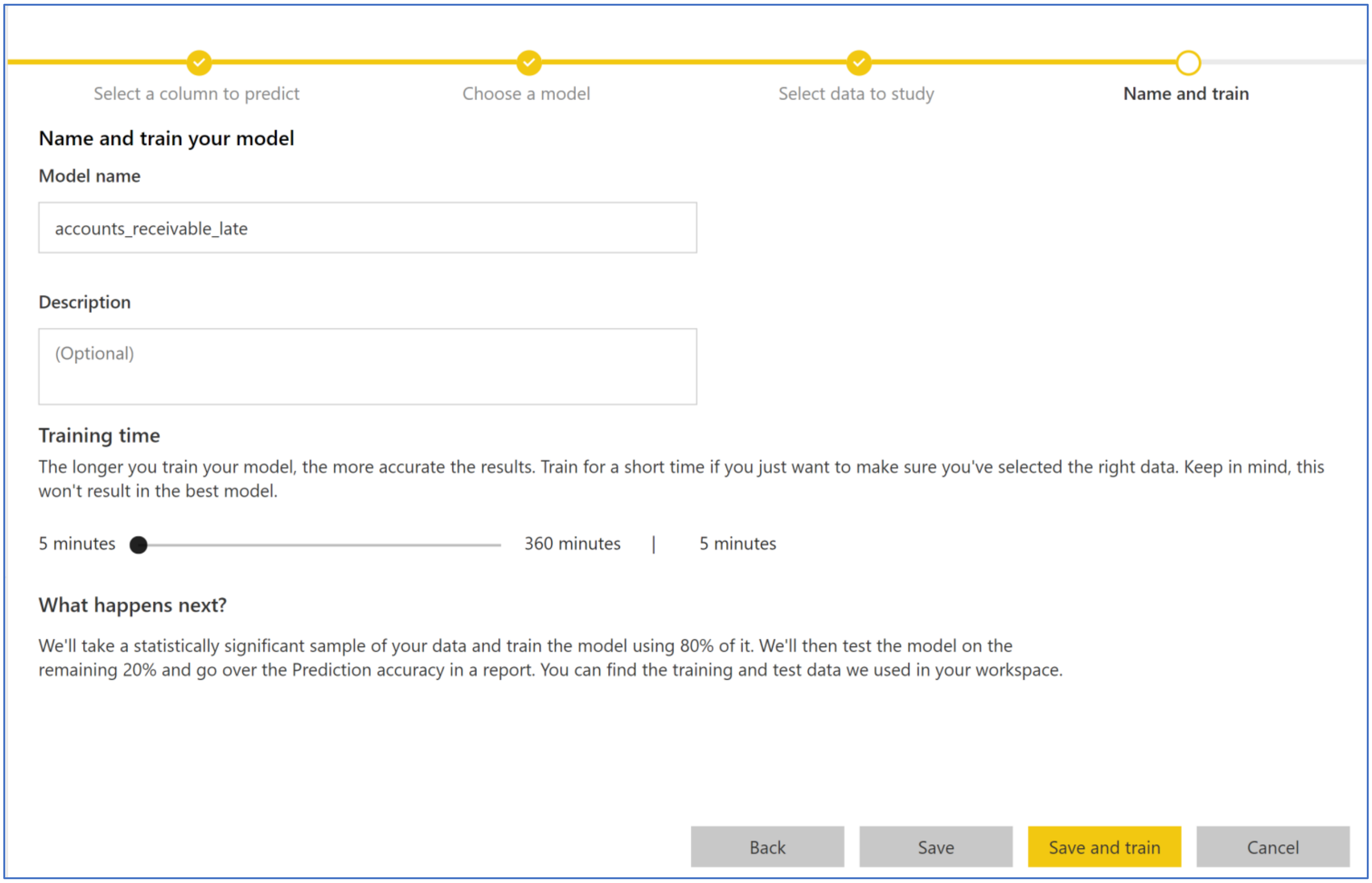




Select all attributes **except** customerID, invoiceNumber, daystosettle, and dayslate – (these last 2 are directly related to being late or not)

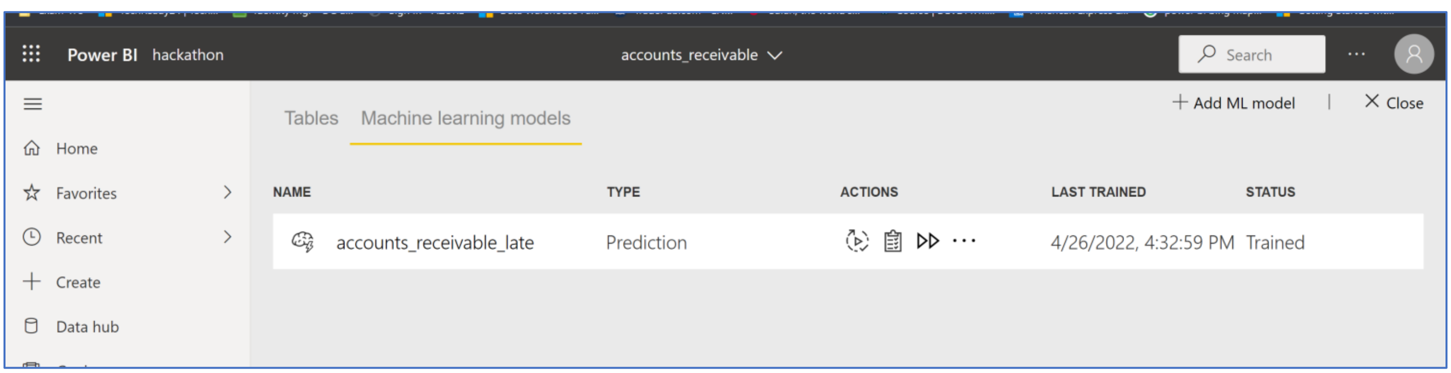
Provide the Model Name – accounts_receivable_late

Click Save & Train – just go with 5 mins (Pl. use the slider to bring down the value to 5)



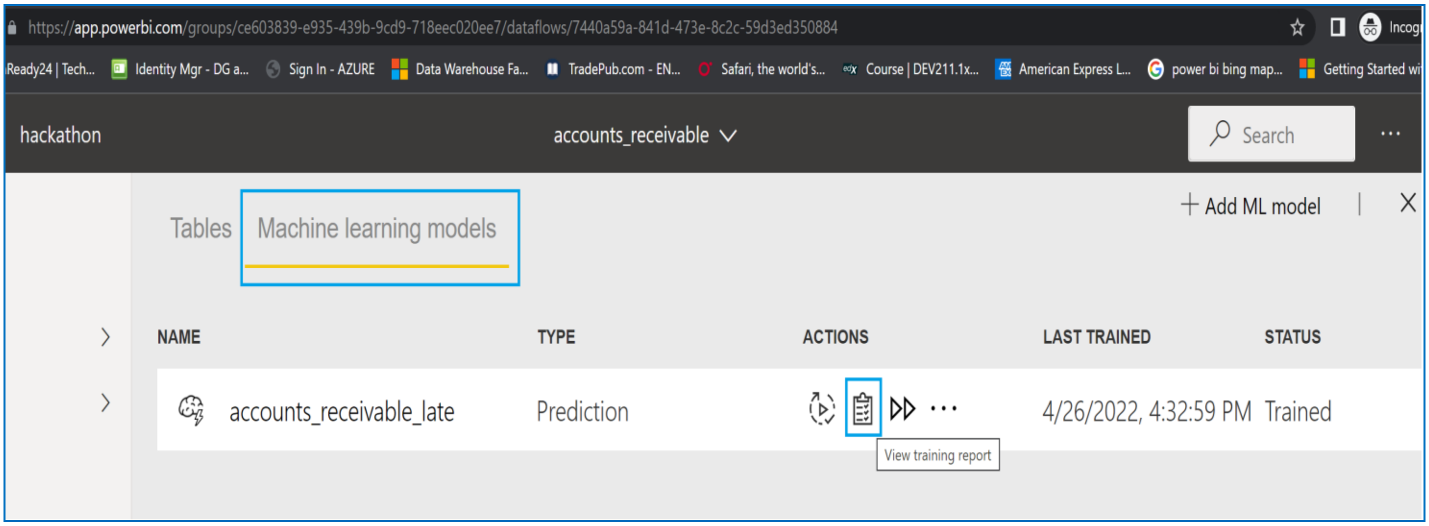
C) Review the Power BI Model Validation Report

After a few minutes, the model should complete



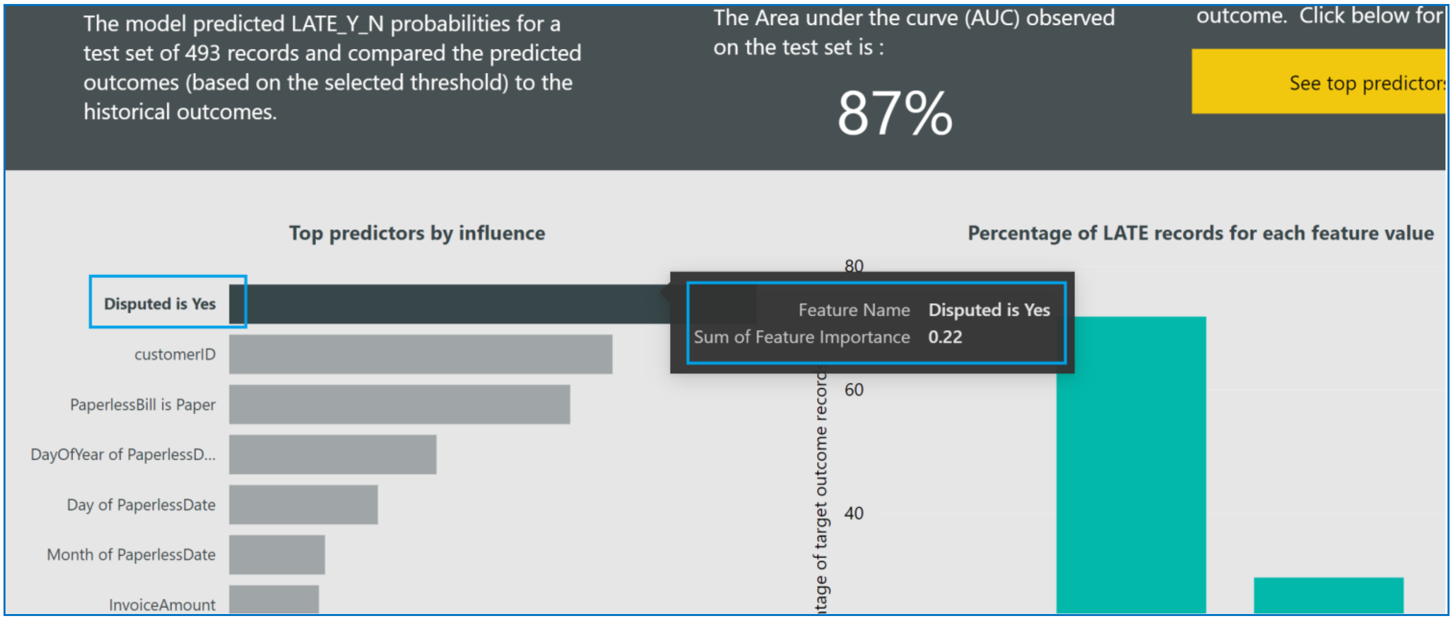
Go into Machine Learning models

View training report

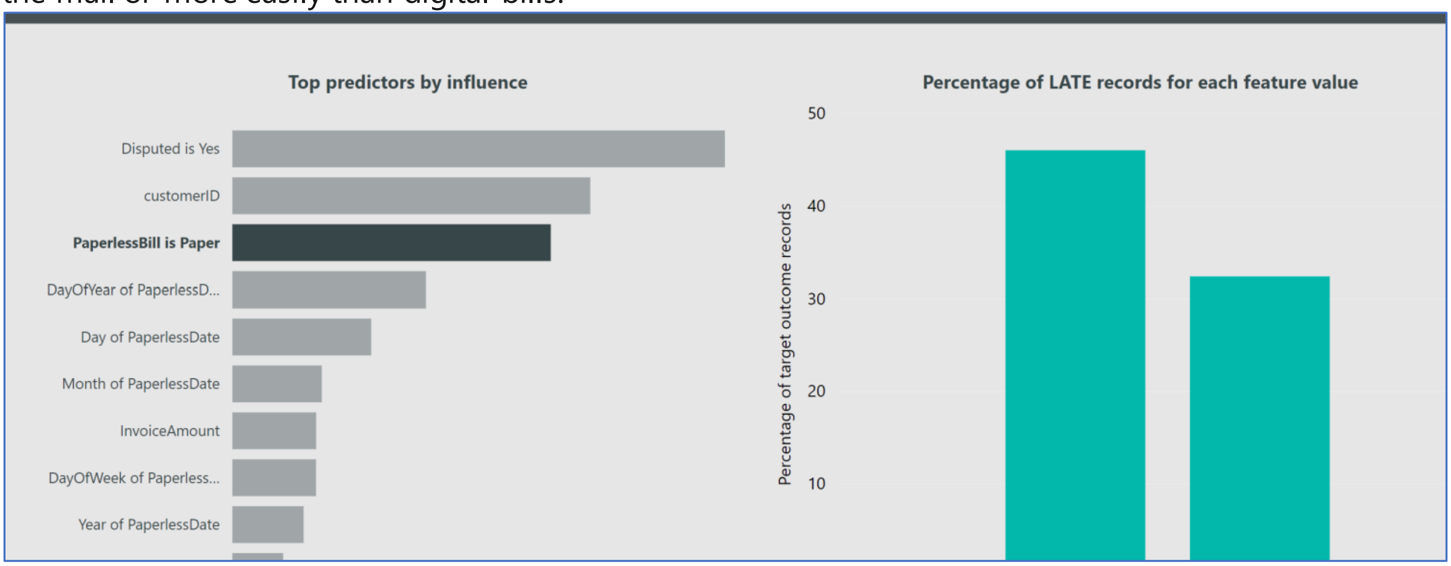


Click on top predictors:

Click on disputed – you can see it explain 22% of why a bill might be late. If a bill is under dispute, it could explain why the payment would be late.

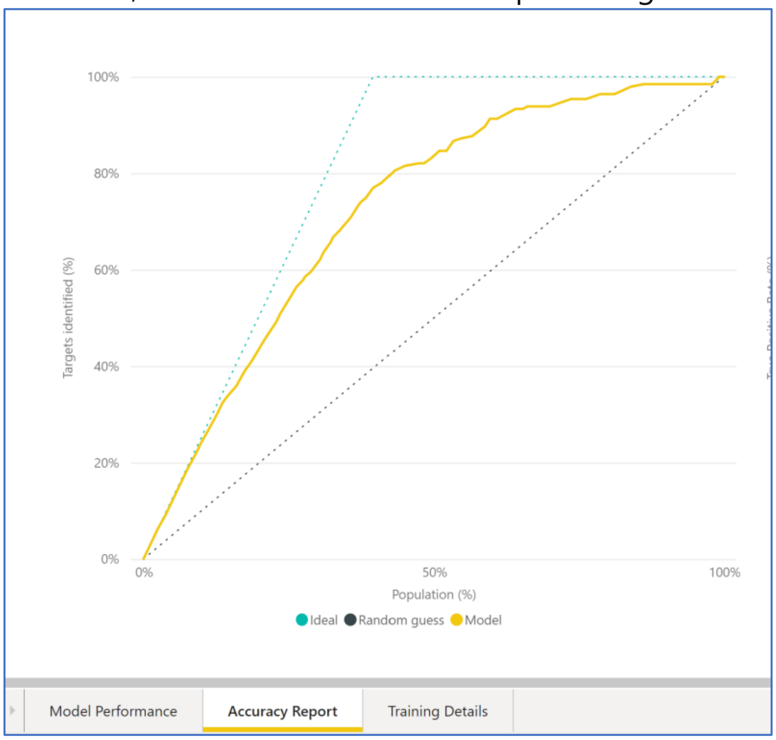


Click on Paperless Bill – which explains 14% of why a bill might be late. Paper bills could get loss in the mail or more easily than digital bills.



Notice how there is an inverse relationship between precision and threshold settings. As you increase the precision the recall decreases and vice versa. So, depending on what is more important – i.e. predicting late and actually being late or predicting late but wasn't late at all you can modify your objective

Click on the Accuracy Tab to see the area under the curve. The area under the curve represents the gain of not just randomly guessing late or not for each customer invoice. Hence, the more area under the curve, the better the model is at predicting lateness or not.

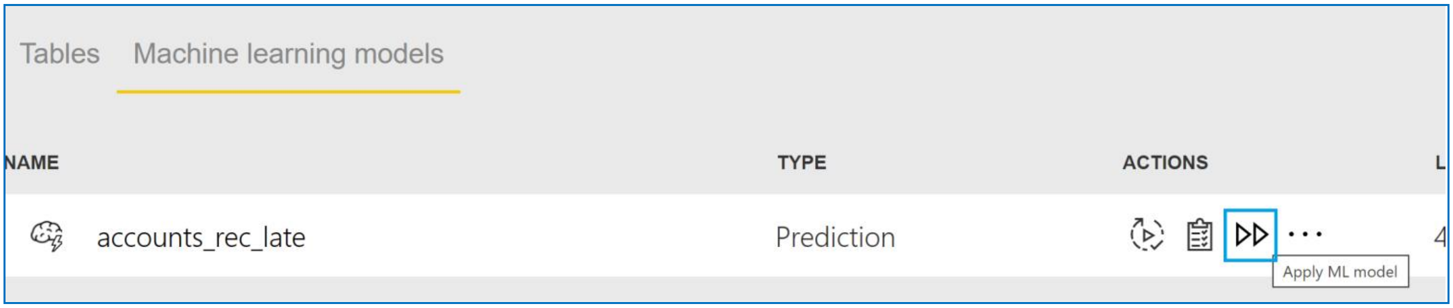


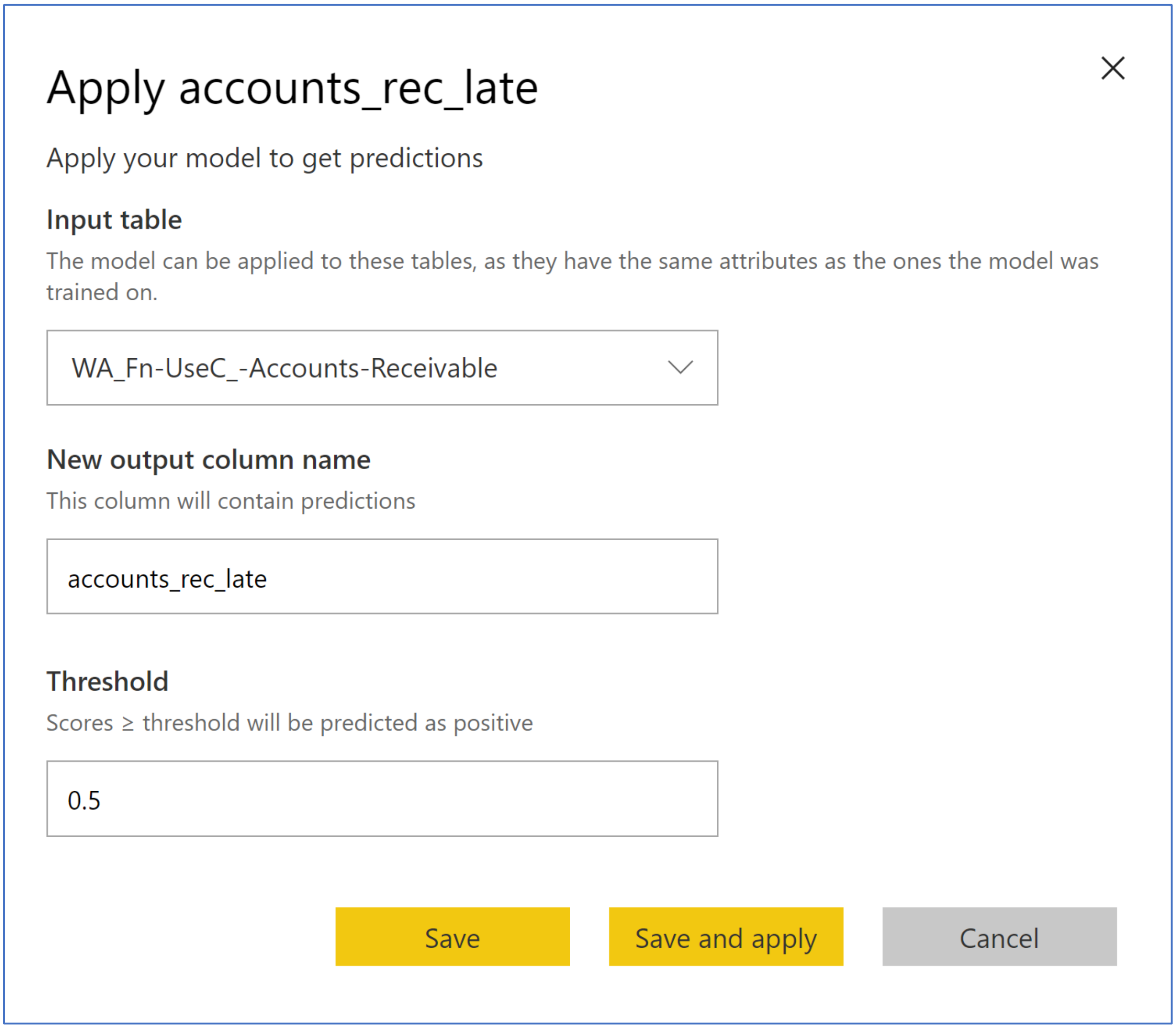
D) Apply the Model

Important

Preparation takes **10-15 minutes** to prepare the experiment run. Once running, it takes **2-3 minutes more for each iteration**.

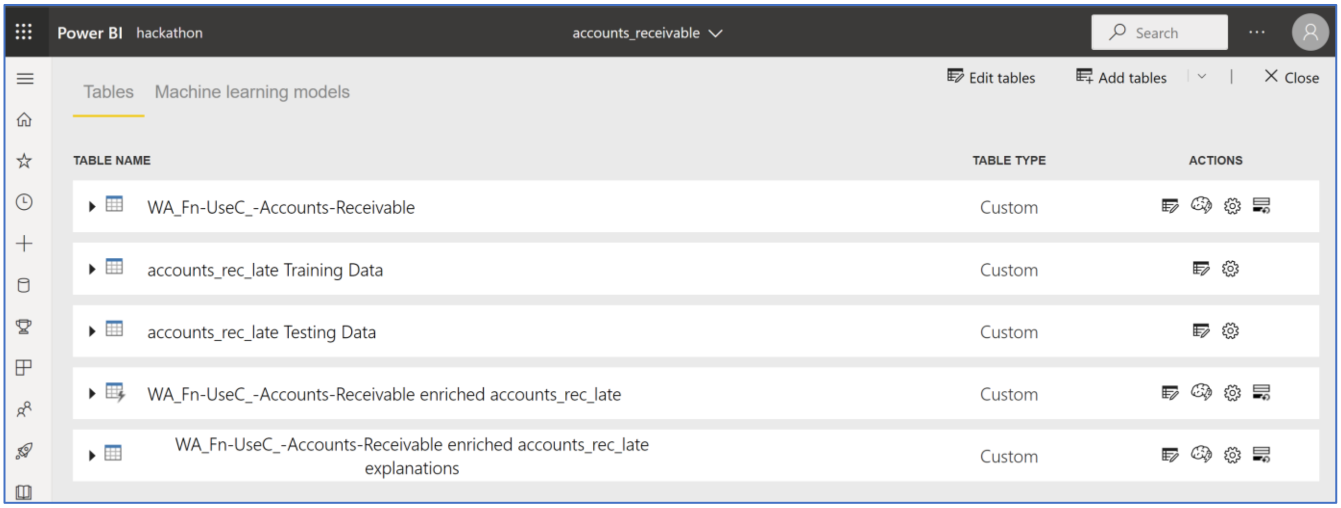
In production, you'd likely walk away for a bit. But for this tutorial, we suggest you start exploring the tested algorithms on the **Models** tab as they complete while the others are still running.





Click Save & Apply

Click on enriched late to see predictions and explanations on a record by record basis



Example: