

Examples

FORTANIX CONFIDENTIAL AI – CHURN PREDICTION

Version 1.0

TABLE OF CONTENTS

1.0	INTRODUCTION	2
2.0	PREREQUISITES	2
3.0	DATA INGESTION	2
3.1	About the Data	2
3.2	Collect the Data	3
4.0	DATA PREPARATION	5
5.0	ADD A MODEL	6
6.0	BUILD A MODEL	7
7.0	DATA INFERENCE	8
8.0	RUN INFERENCE	10
9.0	DOCUMENT INFORMATION	12
9.1	Document Location	12
9.2	Document Updates	12

1.0 INTRODUCTION

Fortanix Confidential Artificial Intelligence (AI) is a service for developing and deploying AI models on sensitive data using confidential computing. This service provides multiple stages of the data pipeline for an AI project and secures the following stages using confidential computing which ensures that the data can be processed, and models can be developed while keeping the data confidential even when in use.

1. Stage 1: Data Ingestion
2. Stage 2: Data Separation
3. Stage 3: Add a Model
4. Stage 4: Build a Model

2.0 PREREQUISITES

- A user signed in to a Confidential AI account.

For instructions on how to sign up and log in, refer to our [User's guide: Sign up for Confidential AI](#).

3.0 DATA INGESTION

This is the first stage, where the data will be collected either by connecting to an S3 bucket or uploading a file to the Confidential AI platform.

3.1 ABOUT THE DATA

Churn prediction determines the customers that are at high risk of leaving your company or cancelling a subscription to a service based on their behavior with your product.

The data set includes the following information:

- Customers who left within the last month – the column is called Churn.
- Services that each customer has signed up for – phone, multiple lines, internet, online security, online backup, device protection, tech support, and streaming TV and movies.
- Customer account information – how long they have been a customer, contract details, payment methods, paperless billing, monthly charges, and total charges.

- Demographic information about customers – gender, age range, and if they have partners and dependents.

3.2 COLLECT THE DATA

Perform the following steps to collect the data on Confidential AI platform:

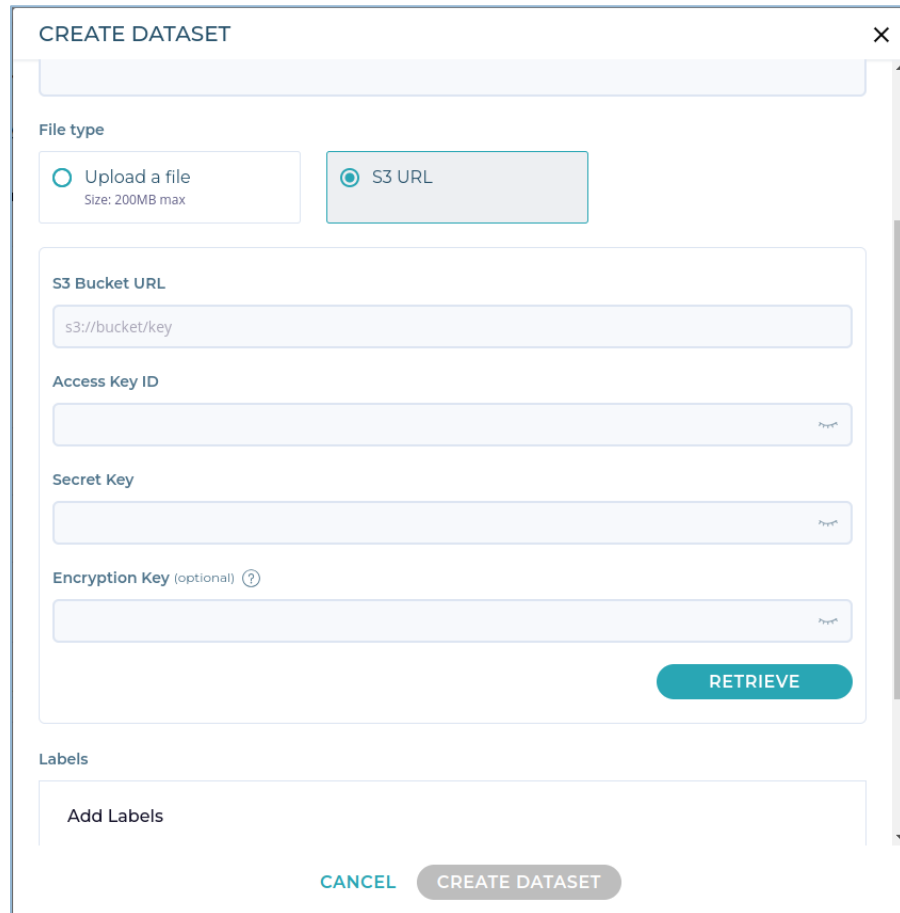
1. On the **Data Ingestion** page, click **CREATE DATASET**, and select **CSV Dataset** option.
2. In the **CREATE DATASET** form, enter the following details:
 - **Dataset Name:** Enter the name of the dataset. For example, `churn_prediction`.
 - **Description:** Enter the details of the dataset.
 - **File Type:**
 - **Upload a File:** Select the **Upload a file** option to upload your data directly to the Fortanix Confidential AI platform.

FIGURE 1: UPLOAD FILE DETAILS

- **S3 URL:** Select the S3 URL to bring your data by connecting to an S3 account.
 - **S3 Bucket URL:** Enter the URL of the image in the S3 bucket.
 - **Access Key ID:** Enter the Access Key ID for Confidential AI to be able to access the data on your S3 bucket.

- **Secret Key:** Enter the Secret Key for Confidential AI to be able to access the data on your S3 bucket.
- **Encryption Key:** Enter the encryption key that was used to encrypt the file on your S3 bucket (User’s Guide: Prepare your S3 Bucket).

For more details on how to prepare your S3 bucket for Confidential AI, refer to the [User’s Guide: Preparing Your S3 Bucket for Confidential AI](#).



The screenshot shows a 'CREATE DATASET' dialog box with the following elements:

- File type:** Two radio button options: 'Upload a file (Size: 200MB max)' and 'S3 URL' (which is selected).
- S3 Bucket URL:** A text input field containing 's3://bucket/key'.
- Access Key ID:** A text input field with a 'Show/Hide' icon.
- Secret Key:** A text input field with a 'Show/Hide' icon.
- Encryption Key (optional):** A text input field with a 'Show/Hide' icon and a help icon.
- RETRIEVE:** A teal button located at the bottom right of the S3 configuration section.
- Labels:** A section with an 'Add Labels' button.
- Navigation:** 'CANCEL' and 'CREATE DATASET' buttons at the bottom center.

FIGURE 2: S3 URL DETAILS

- **Detected headers:** The headers (column names) are self-detected and displayed when CSV dataset is selected.
 - **Labels:**
 - **Add Labels:** To track what the data is used for; you can optionally add Labels in the form of “Key:Value” pairs.
3. Click the **CREATE DATASET** button to save the data.

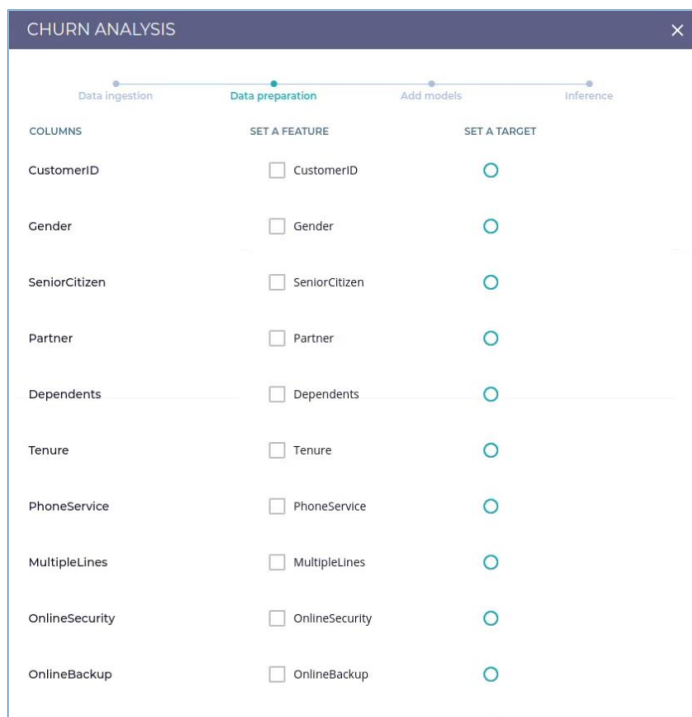
For a more detailed guide about the Confidential AI data ingestion process, refer to the [User's Guide: Data Ingestion](#).

4.0 DATA PREPARATION

Perform the following steps to prepare the data to apply algorithms on it.

1. On the **Data Preparation** page, click the **ADD VARIABLES** button to select the features and target.
2. Select one or more features and target from the **SET A FEATURE** and **SET A TARGET** column respectively, for the model training phase. These features and targets are called Variables. For example, in the churn prediction, all the features are the Variables, while the Churn column is the Target.
3. For each set of features (X), you can choose only one target (Y).
4. Click **ADD** to add the variables.
5. The variables are added, click the **SAVE** button to save the variables.

For a more detailed guide about the Confidential AI data preparation process, refer to the [User's Guide: Data Preparation](#).



COLUMNS	SET A FEATURE	SET A TARGET
CustomerID	<input type="checkbox"/> CustomerID	<input checked="" type="radio"/>
Gender	<input type="checkbox"/> Gender	<input checked="" type="radio"/>
SeniorCitizen	<input type="checkbox"/> SeniorCitizen	<input checked="" type="radio"/>
Partner	<input type="checkbox"/> Partner	<input checked="" type="radio"/>
Dependents	<input type="checkbox"/> Dependents	<input checked="" type="radio"/>
Tenure	<input type="checkbox"/> Tenure	<input checked="" type="radio"/>
PhoneService	<input type="checkbox"/> PhoneService	<input checked="" type="radio"/>
MultipleLines	<input type="checkbox"/> MultipleLines	<input checked="" type="radio"/>
OnlineSecurity	<input type="checkbox"/> OnlineSecurity	<input checked="" type="radio"/>
OnlineBackup	<input type="checkbox"/> OnlineBackup	<input checked="" type="radio"/>

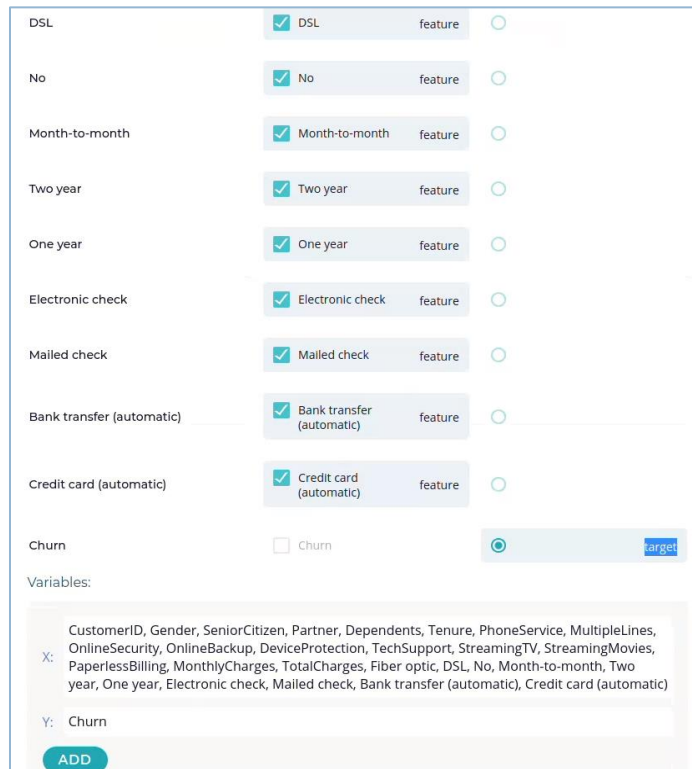


FIGURE 3: VARIABLE DIALOG BOX

5.0 ADD A MODEL

On the **Add Model** page, click the **ADD MODEL** button and select **Build Model** option from the drop down menu. With this option, you can choose to run a selection of pre-curated AI algorithms on the datasets defined in the previous phases, to analyze and build AI models.

- For more details about the AI algorithms, refer to [Confidential AI-Algorithms](#).
- For more details about building a model, refer to [User's Guide: Build a Model](#).

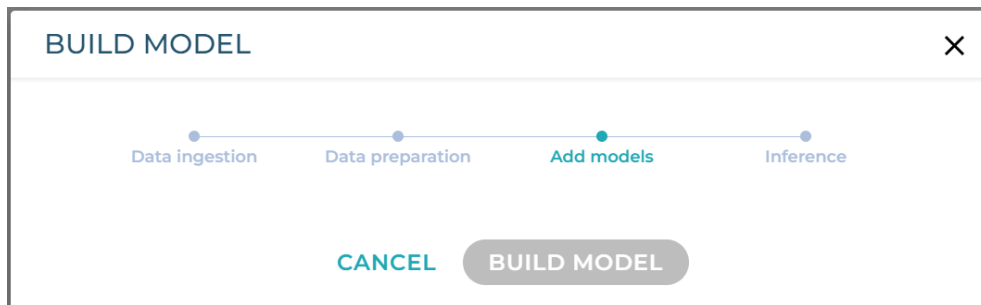


FIGURE 4: ADD MODEL

6.0 BUILD A MODEL

Perform the following steps to build a model:

1. On the **Add Models** page, click the **ADD MODEL** button to add a new model and select **Build Model** to build a training model for the dataset created in *Section 4.0 – Data Preparation*.
2. In the **BUILD A MODEL** form, enter the following details:
 - **Training flow name:** Enter the name of the model such as `churn_prediction`.
 - **Training Dataset:** Select the training dataset on which you want to run the AI algorithm and build a trained model.
 - **Algorithm:** Select the algorithm that you want to run on the training dataset to get a trained model.
 - **Select ML variables:** Select ML variables that you created in the Data Preparation phase.
 - **Model:**
 - **Model name:** Enter the name of the output dataset. This is the output model that will be used in the data inference phase.

- o **Description:** Enter the details of the model.

The screenshot shows a 'BUILD MODEL' dialog box with a progress bar at the top indicating the current step is 'Add models'. The form fields are as follows:

- Training flow name: Churn prediction
- Training Dataset: Churn Analysis [CSV]
- Algorithm: Logistic regression
- Select ML variables: CustomerID, Gender, SeniorCitizen, Partner, Dependents, Tenure, PhoneService, MultipleLines, Online
- Model name: logistic regression
- Description: Logistic regression model to predict churn analy

Buttons at the bottom: CANCEL, BUILD MODEL

FIGURE 5: BUILD MODEL DIALOG BOX

3. Click the **BUILD MODEL** button to run the selected algorithm on the training data and build the model for inference.
4. To run the training model, click the **RUN** button below the model.
5. After the execution is completed successfully, the model is now trained and ready. Click the execution log status message to view and download the execution log report.

7.0 DATA INFERENCE

In this stage, the data is passed through a machine learning model to identify and predict the output from the data.

Perform the following steps:

1. In the **INFERENCE** tab, click the **BUILD INFERENCE** option to predict the data output.
 - **Inference flow name:** Enter the name of the inference flow and select the inference dataset in the Input dataset.
 - **Select model:**

- **Model:** Select the trained model that was built in *Section 6.0 – Build a Model*.
- **Select a model:** Select the required model from the drop down menu.
- **Select input database:** Select the required input database from the drop down menu.
- **Output Configuration:**
 - **Output name:** Enter a name for the output dataset that will contain the predicted output.
- The **Encrypt Dataset** option is selected by default to generate an encryption key and add an extra layer of protection to the output data. Copy or download the key to decrypt the output data for viewing.

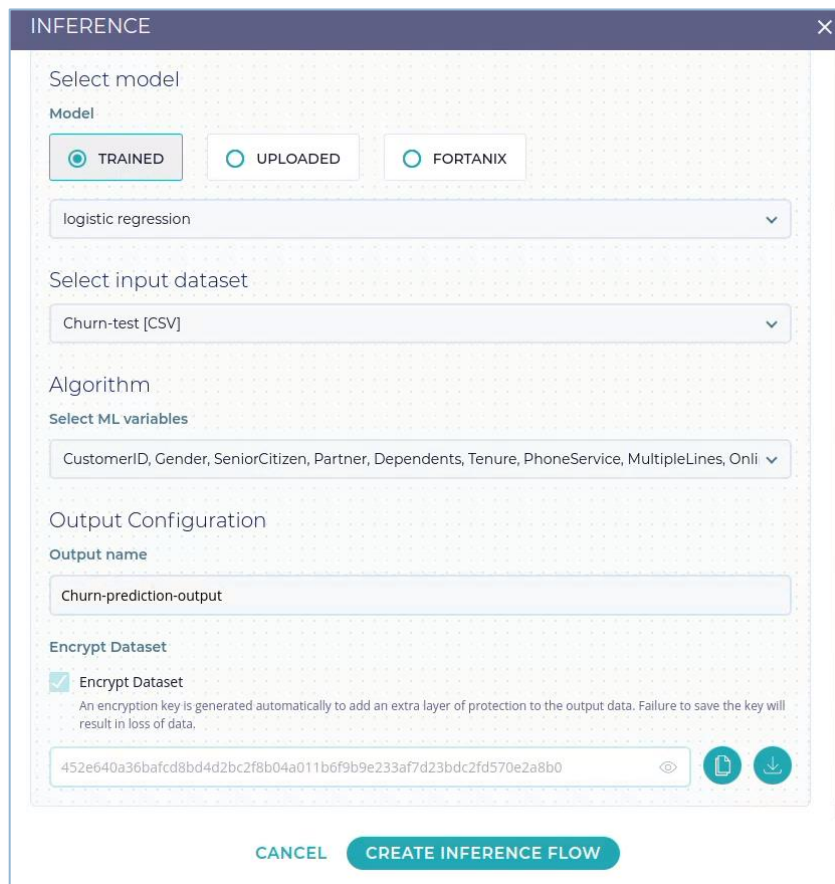


FIGURE 6: INFERENCE DIALOG BOX

2. Click the **CREATE INFERENCE FLOW** to pass the data through a machine-learning model and predict the output.
3. After the inference is successfully created, click the **RUN** button below the inference workflow to run the model and predict the output.

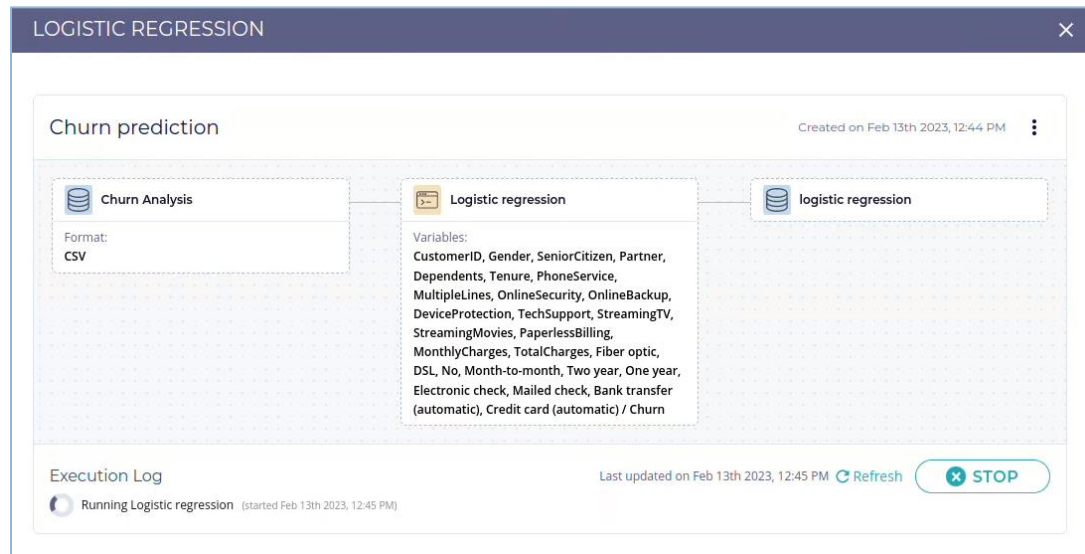


FIGURE 7: RUN SCREEN

8.0 RUN INFERENCE

When the model was executed successfully, the status of the execution is shown under the Execution Log.

1. Click the **Execution Log** link to view the log details.
2. After the execution is completed successfully, the output is now predicted and ready to be viewed.
3. To view the output, click the **DOWNLOAD** button.
4. In the **DOWNLOAD** dialog box, enter the decryption key to decrypt the output.
5. A *.tar file is generated on your local machine. Extract the contents of the file to view the Churn predictions from the model.

	O	P	C	R	S	T	U	V	W	X	Y	Z	AA	AB
1	PaperlessBilling	MonthlyCharges	TotalCharges	Fiber optic	DSL	No	Month-to-month	Two year	One year	Electronic check	Mailed check	Bank transfer (automatic)	Credit card (automatic)	Churn
2	1	1.16006854	-0.4609421393	1	0	0	1	0	0	0	0	0	1	0
3	0	1.710158761	0.7127977644	1	0	0	0	0	1	0	0	0	0	1
4	1	0.5285450247	1.496710086	1	0	0	0	1	0	0	0	0	0	1
5	0	0.0133547882	0.9969464045	0	1	0	0	0	1	0	0	0	1	0
6	1	0.6398925919	0.9015022836	1	0	0	1	0	0	0	0	0	1	0
7	1	0.486997425	1.420191561	0	1	0	0	1	0	0	0	0	0	1
8	1	0.9739352936	-0.220975282	1	0	0	1	0	0	1	0	0	0	1
9	1	0.4388022093	-0.631515143	1	0	0	1	0	0	0	1	0	0	0
10	1	0.9772591016	-0.9333982582	1	0	0	1	0	0	1	0	0	0	1
11	1	0.5218974087	-0.785456562	1	0	0	1	0	0	1	0	0	0	1
12	0	-1.49399213	-0.9985349554	0	0	1	1	0	0	0	1	0	0	0
13	0	0.9805829066	-0.205137782	1	0	0	0	0	1	0	0	0	0	1
14	1	1.384425579	1.772057662	1	0	0	1	0	0	1	0	0	0	0
15	1	0.3174832181	-0.8595928436	1	0	0	1	0	0	1	0	0	0	1
16	1	1.351187499	1.603006646	1	0	0	1	0	0	0	0	0	1	0
17	1	1.003849565	0.2510617386	1	0	0	1	0	0	0	0	0	0	1
18	0	1.329582747	0.8155430187	1	0	0	1	0	0	0	0	0	1	0
19	0	-0.3489402813	-0.3251322358	0	1	0	0	0	1	0	1	0	0	0
20	0	0.1745594751	-0.8737986699	1	0	0	1	0	0	1	0	0	0	1
21	1	0.3457355859	-0.156147394	1	0	0	1	0	0	0	0	0	1	0
22	0	-1.487344514	-0.8901870188	0	0	1	1	0	0	0	0	0	0	1
23	1	1.349525595	2.076146557	1	0	0	0	0	1	1	0	0	0	0
24	1	-0.4386830967	-0.3711448164	0	1	0	1	0	0	1	0	0	0	0
25	0	0.6880878076	1.07205323	1	0	0	1	0	0	0	0	0	1	0
26	0	0.3590308178	-0.231474797	1	0	0	1	0	0	0	0	0	1	0
27	1	1.171701868	0.5279313032	1	0	0	1	0	0	1	0	0	0	1
28	0	0.8792067663	1.083038016	1	0	0	0	0	1	1	0	0	0	0
29	1	1.693539721	2.698044303	1	0	0	0	1	0	0	0	0	0	1
30	1	0.9938781415	1.388340091	1	0	0	0	0	1	0	0	0	0	1
31	0	-1.502301649	-0.7042397251	0	0	1	0	0	1	0	0	1	0	0
32	1	1.166716156	1.510077115	1	0	0	0	1	0	0	0	0	1	0
33	1	-1.45244453	-0.7908386664	0	0	1	0	0	1	0	0	0	0	1
34	0	-1.487344514	-0.407209327	0	0	1	0	0	1	0	0	0	0	1
35	1	0.5036164548	-0.930322233	1	0	0	1	0	0	1	0	0	0	1
36	1	1.407692235	2.248351839	1	0	0	0	0	1	0	0	0	0	1
37	1	0.6714687677	-0.9697936359	1	0	0	1	0	0	1	0	0	0	1
38	1	0.8227020307	-0.5565406649	1	0	0	1	0	0	1	0	0	0	1
39	1	0.5567873925	1.211304151	1	0	0	1	0	0	1	0	0	0	0
40	1	-0.211022503	-0.1446552777	0	1	0	0	0	1	0	1	0	0	0
41	1	1.025454317	1.967953025	1	0	0	0	0	1	0	0	0	0	1
42	1	0.5252212167	1.174974946	0	1	0	0	1	0	0	0	1	0	0
43	1	1.605458809	2.631584137	1	0	0	0	1	0	0	0	0	1	0
44	1	-0.1943832104	-0.7418923978	0	1	0	0	1	0	0	1	0	0	0
45	0	-1.503963553	-0.9986673023	0	0	1	1	0	0	0	1	0	0	0
46	1	0.7063687515	-0.6393236059	1	0	0	1	0	0	0	0	0	1	0
47	1	-0.6397734793	-0.7439217158	0	1	0	1	0	0	0	0	0	0	1

FIGURE 8: OUTPUT SHEET

9.0 DOCUMENT INFORMATION

9.1 DOCUMENT LOCATION

The latest published version of this document is located at the URL:

<https://support.fortanix.com/hc/en-us/articles/16587436889876-Churn-Prediction>

9.2 DOCUMENT UPDATES

This document will typically be updated on a periodic review and update cycle.

For any urgent document updates, please send an email to: support@fortanix.com

© 2016 – 2022 Fortanix, Inc. All Rights Reserved.

Fortanix® and the Fortanix logo are registered trademarks or trade names of Fortanix, Inc.

All other trademarks are the property of their respective owners.

NOTICE: This document was produced by Fortanix, Inc. (Fortanix) and contains information which is proprietary and confidential to Fortanix. The document contains information that may be protected by patents, copyrights, and/or other IP laws. If you are not the intended recipient of this material, please destroy this document and inform info@fortanix.com immediately.