Telecom user churn analysis using Machine Learning & IBM AutoAI

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Abstract

India posts some impressive telecom numbers: it has **1,198.89 million subscribers** and 16 major providers; it is the **second-largest** telecommunication market in the world, and it is set to become the **fourth-largest** smartphone market in the next few years. [1]

India also puts up some equally concerning churn numbers:

96% of mobile subscribers are constantly shifting service providers in search of a better deal

6% is the average monthly churn rate for Indian telecom customers. [2]

This problem is not only faced by the Indian telecom industry but each and every telecom industry around the world.

Companies usually have a greater focus on customer acquisition and keep retention as a secondary priority. However, it can cost **five times** more to attract a new customer than it does to retain an existing one. Increasing customer retention rates by 5% can increase profits by **25%** to **95%**, according to research done by Bain & Company.[2]

Keywords: Churn analysis; Telecom churn analysis; Telecommunication; Machine learning in Telecom, IBM AutoAI

1. Introduction

Customer churn, when a customer ends their relationship with a business, is one of the most basic factors in determining the revenue of a business. You need to know which of your customers are loyal and which are at risk of churning, and you need to know the factors that affect these decisions from a customer perspective.

Customer churn is likely more costly in telecommunication sector than in other industries based on customers' attitudes toward the sector, but companies aware of this fact can use data analytics in an effort to specifically bring down churn rates by identifying and relieving customer pain points, as well as understanding customer behavior on a deeper level.

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2.   Motivation andcontribution

The main objective behind this project is to help telecom industries identify the customers likely to churn and shift to a different telecom operator. This will allow the telecom operators to take necessary actions to prevent the churning of customers. The project uses IBM's AutoAI to predict the customers likely to churn.

In this way, companies can focus on customer acquisition as well as customer retention. Highlighting the statistic mentioned earlier, By increasing customer retention rates by 5% can increase profits by **25%** to **95%**. [2] This can be achieved using our Machine Learning model

Research has shown that mobile phones in India number more than the population of the country and this is reflected in the way the government's flagship identification number initiative, Aadhar, is now entirely mobile number driven along with physical and biometric identification details.

Having said that, the success story of the Indian Telecom Sector is punctured by the practices of successive governments in awarding licenses and scarce spectrum ostensibly with a view to facilitate ease of connectivity but at the same time following a flawed and overpriced mechanism.

Moreover, the fact that the telecom operators do flout rules especially when selling prepaid connections to customers without background checks has given rise to security concerns and other problems.

In addition, despite massive investments in physical infrastructure in the form of mobile towers and other installations, connectivity is a major issue with the quality of calling and receiving calls being marred by call drops and punctuated by "noise" in the form of poor quality of conversations. it is high time for telecom industries to act accordingly. We can clearly see how Jio and Airtel are ruling Indian Telecom sectors.

3. Implementation:

Set up your AutoAI environment and generate pipelines a. To start the AutoAI experience, click Add to Project + from the top and select AutoAI experiment. b. Name your AutoAI experiment asset and leave the default compute configuration option listed in the drop-down menu, then click Create. c. To configure the experiment, we must give it the dataset to use. Click on the Select from project option. d. In the dialog, select the Telco-Customer-Churn.csv dataset that was uploaded in the previous step, then click Select asset.

Prediction:

a. Once the dataset is read in, we need to indicate what we want the model to predict. Under the Select prediction column, find and click on the Churn row.

b. AutoAI will set up defaults values for the experiment based on the dataset. This includes the type of model to build, the metrics to optimize against, the test/train split, etc. You could view/change these values under Experiment settings. For now, we will accept the defaults and click the Run experiment button.

c. The experiment can take several minutes to run. Upon completion, you will see a message that the pipelines have been created.

Save AutoAI model

a. Scroll down to see the Pipeline leaderboard. The top-performing pipeline is in the first rank.

b. The next step is to select the model that gives the best result by looking at the metrics. In this case, Pipeline 4 gave the best result with the metric "Accuracy (optimized)". You can view the detailed results by clicking the corresponding pipeline from the leaderboard.

c. The model evaluation page will show metrics for the experiment, feature transformations performed (if any), which features contribute to the model, and more details of the pipeline.

Deploy the model

a. To deploy this model, click on Save as, then Model to save.

b. A window opens that asks for the model's name, description (optional), etc. You can accept the defaults or give your model a meaningful name/description and then click Save.

c. You receive a notification to indicate that your model is saved to your project. Go back to your project main page by clicking on the project name on the navigator on the top left.

d. Under the Models section of the Assets page, click the name of your saved model.

e. To make the model available to be deployed, we need to make it available in the deployment space. Click on Promote to deployment space.

f. To promote an asset, the project must first be associated with a deployment space. Click Associate Deployment Space

Check your deployment.

a. If you came in through the Menu > Analyze > Analytics deployments path, click on your deployment space.

b. Under the Assets tab, click on the AutoAI model you just promoted.

c. Click Create deployment in the top-right corner.

d. On the Create a deployment screen, choose Online for the deployment type, give the deployment a name and an optional description, then click Create.

e. The deployment will show as "In progress" and switch to "Deployed" when done

Testing the deployed model

a. Click on the deployment. The deployment API reference tab shows how to use the model using Curl, Java, JavaScript, Python, and Scala. Click on the corresponding tabs to get the code snippet in the language you want to use.

b. To get to the built-in test tool, click the Test tab, then click on the Provide input data as JSON icon and paste the following data under Body:

```json
{
  "input_data":[
    {
      "fields":[ "customerID", "gender", "SeniorCitizen", "Partner", "Dependents", "tenure", "PhoneService", "MultipleLines", "InternetService", "OnlineSecurity", "OnlineBackup", "DeviceProtection", "TechSupport", "StreamingTV", "StreamingMovies", "Contract", "PaperlessBilling", "PaymentMethod", "MonthlyCharges", "TotalCharges"],
      "values":[[ "7567-VHVEG", "Female", 0, "No", "No", 1, "No", "No phone service", "DSL", "No", "No", "No", "No", "No", "No", "Month-to-month", "No", "Bank transfer (automatic)", 25.25, 25.25]]
    }
  ]
}
```

c. Click the Predict button and the model will be called with the input data. The results will display in the Result window. Scroll down to the bottom of the result to see the prediction ("Yes" or a "No" for Churn). Test deployment with JSON

d. Alternatively, you can click the Provide input using form icon and input the various fields, then click Predict. Input to the fields.

4. Development:

We can select the model that gives the best result by looking at the metrics. In our case, Pipeline 4 gave the best result with the metric "Accuracy (optimized)". You can view the detailed results by clicking the corresponding pipeline from the leaderboard.
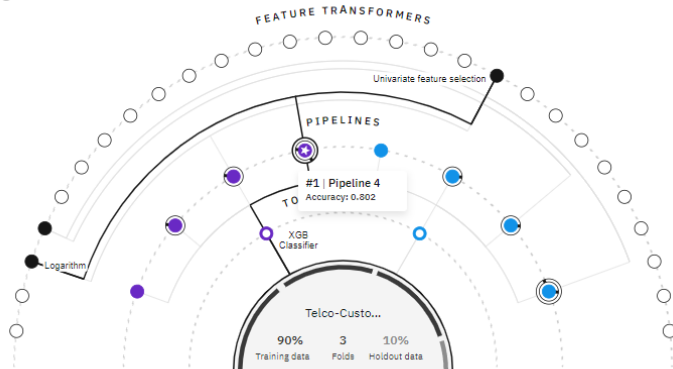

If we want to know more details about a pipeline, we can go to the model evaluation page. The model evaluation page will show metrics for the experiment, feature transformations performed (if any), which features contribute to the model, and more details of the pipeline.
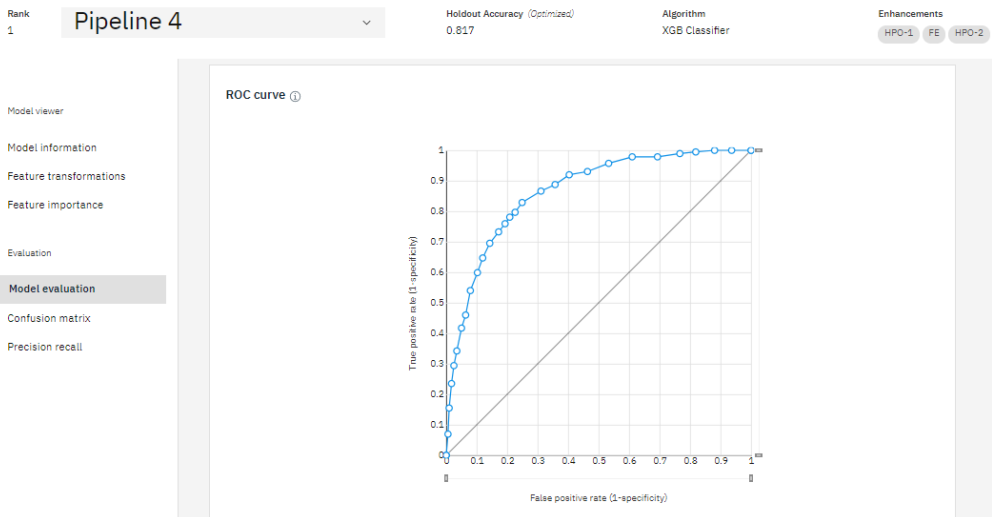
We can compare each pipeline based on their Model name, accuracy, Loss, precision, recall, etc. to find out the ideal pipeline.

Metric chart ⓘ
Prediction column: Churn
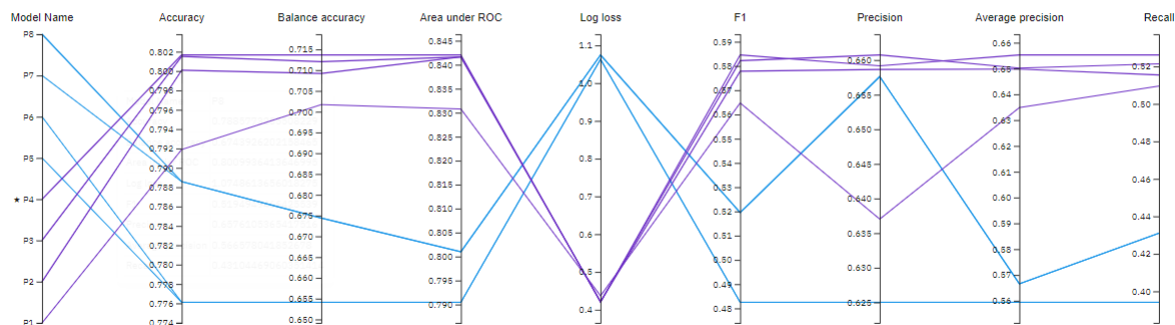
5.   Applications:

1. This model can be used in the Telecom sector to analyze and predict the number of users that are going to churn or switch their telecom providers. Churn is quite common in the telecom industry and models like these can help the telecoms to take necessary actions before they face huge consequences.

2. By changing the dataset, this model can also be used in several sectors such as Retail, Healthcare, Smartphone industry, Manufacturing, Banking, E-commerce, and every other industry that sells products and has competition. Hence, it is very much important for these sectors to take into consideration their customer churn rate.

3. In Banking, this model can be used to identify users who are going to churn and shift to other banks.

4. In E-commerce, this model can be used to identify users who are going to churn and shift to platforms.

5. In the Smartphone market, this model can be used to identify users who are going to churn and shift to smartphones manufactured by another company.

6. These are just examples where customer churn analysis can be majorly used. But the actual applications are limitless!

6.   Conclusion:

In the ever-growing market of Telecom industries and other sectors, there are new telecom operators launching every now and then. And with the digitalization of many countries, almost every person owns a mobile - be it a smartphone, or a regular feature phone.

Hence, it is high time for telecom industries to act accordingly. We can clearly see how Jio and Airtel are ruling Indian Telecom sectors. The main reason behind their success is that they have identified customer churn and managed to find a way to retain the customers.

Hence Machine learning models like ours help the companies identify users who are likely to churn and helps to retain those customers accordingly

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References

1. https://www.absolutdata.com/blog/can-data-analytics-stop-indias-telecom-churn-crisis/
2. https://www.gravysolutions.io/post/customer-churn-rate-and-retention-top-25-stats-you-need-to-know
3. https://dantusaikamal.github.io/
4. https://github.com/Dantusaikamal/Telecom-users-churn-analysis