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Agenda/Definition: The project aims to predict customer churn for a Gym using the CHAID decision tree method. By analyzing customer data, the model identifies key factors influencing churn, helping the bank target retention efforts effectively

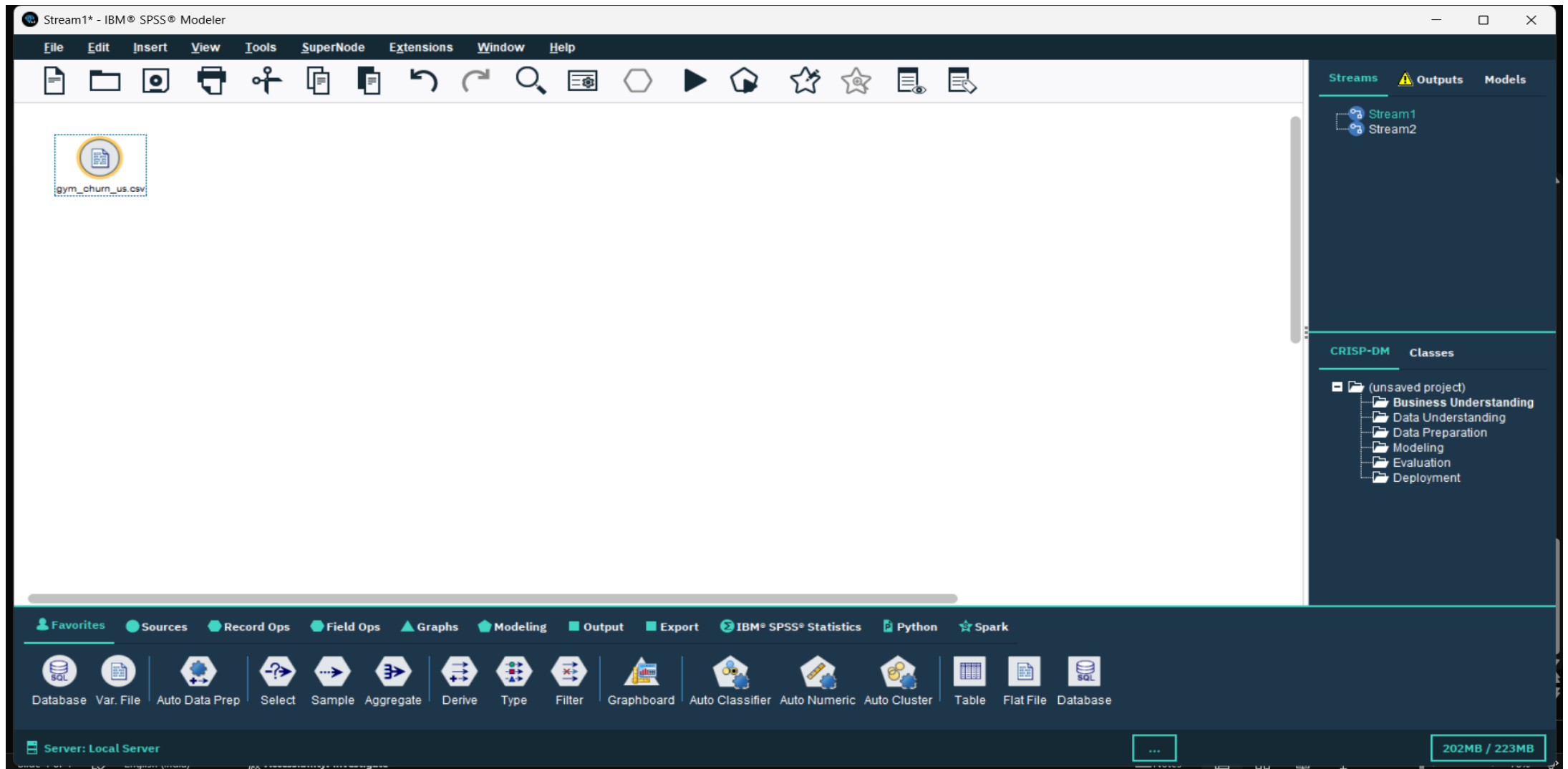
Outcomes/Learning: You will learn how to build a classification model to predict customer churn using CHAID in IBM SPSS Modeler. The project demonstrates the process of data preparation, model configuration, execution, and interpretation of results.

Required Tool: The tool used for this project is IBM SPSS Modeler.

Working :The project involves importing customer data, setting variable roles, configuring the CHAID model node, running the decision tree analysis, and interpreting the decision tree output. This workflow aids in understanding customer segments likely to churn.

Step 1: Import Data

Loaded the dataset (churn_prediction.csv) into SPSS Modeler and confirmed all fields were correctly recognized.



Step 2: Inspect and Prepare Data:

Checked for missing or invalid values and corrected any formatting or data type issues

The screenshot displays the IBM SPSS Modeler Stream2 interface. A central window titled "Table (14 fields, 4,000 records) #4" is open, showing a preview of the data. The table has 14 columns: gender, Near_Location, Partner, Promo_friends, Phone, Contract_period, Group_visits, Age, and Avg_additional_charges. The data is presented in a grid with 20 rows visible. The interface includes a top menu bar (File, Edit, Insert, View, Tools, SuperNode, Extensions, Window, Help) and a bottom toolbar with various data processing tools like Database, Var. File, Auto Data Prep, Select, Sample, Aggregate, Derive, Type, Filter, Graphboard, Auto Classifier, Auto Numeric, Auto Cluster, Table, Flat File, and Database. On the right side, there is a sidebar with tabs for Streams, Outputs, and Models. The Models tab is active, showing a CRISP-DM process flow with stages: Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment. The status bar at the bottom indicates "Server: Local Server" and "201MB / 223MB".

	gender	Near_Location	Partner	Promo_friends	Phone	Contract_period	Group_visits	Age	Avg_additional_charges
1	1	1	1	1	0	6	1	29	
2	0	1	0	0	1	12	1	31	
3	0	1	1	0	1	1	0	28	
4	0	1	1	1	1	12	1	33	
5	1	1	1	1	1	1	0	26	
6	1	1	0	0	1	1	1	34	
7	1	1	1	1	0	6	1	32	
8	0	1	0	0	1	1	0	30	
9	1	1	1	1	1	1	1	23	
10	0	1	0	0	1	1	0	31	
11	0	1	0	0	0	6	1	32	
12	1	1	1	1	0	1	0	27	
13	0	1	1	1	1	1	1	33	
14	1	1	0	0	1	1	1	27	
15	0	1	0	0	1	6	0	35	
16	0	1	1	1	1	12	0	29	
17	0	1	1	1	1	1	1	31	
18	0	1	0	1	1	6	1	29	
19	0	1	0	0	1	1	1	30	
20	1	1	1	1	1	12	1	29	

Step 3: Assign Variable Types/Roles :

Used the **Type node** to assign roles and measurement levels. The churn field was defined as the **target variable**.

The screenshot displays the IBM SPSS Modeler interface. A workflow is visible with a 'gym_churn_us.csv' data source connected to a 'Table' node, which is then connected to a 'Type' node. The 'Type' node is currently selected, and a pop-up window titled 'Table (5 fields, 2 records) #5' is open, showing the 'Table' tab. This window displays a table with 5 fields and 2 records. The fields are Lifetime_Mean, Avg_class_frequency_total_Mean, Churn_Mean, gender_to_m/f, and Record_Count. The records are as follows:

	Lifetime_Mean	Avg_class_frequency_total_Mean	Churn_Mean	gender_to_m/f	Record_Count
1	3.775	1.893	0.266	M	2041
2	3.673	1.865	0.265	F	1959

The right sidebar shows the 'Streams' tab with a 'Churn' node. Below it, the 'CRISP-DM' section shows a project structure with folders for Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment. The bottom toolbar includes various nodes like Database, Var. File, Auto Data Prep, Select, Sample, Aggregate, Derive, Type, Filter, Graphboard, Auto Classifier, Auto Numeric, Auto Cluster, Table, Flat File, and Database. The status bar at the bottom indicates 'Server: Local Server' and '189MB / 242MB'.

Step 4: Derive Node:

Derive Node converted the numeric gender codes (0 and 1) into categorical labels “F” and “M” for better readability.

The screenshot displays the IBM SPSS Modeler Stream2* interface. A workflow is visible on the left, starting with a 'gym_churn_us.csv' file, followed by a 'Table' node, a 'Type' node, a 'gender_to_m/f' node, and finally an 'active_gym_users' node. A 'Derive' node is also present in the workflow. A 'Table' window is open in the center, showing the data from the 'Table' node. The table has 5 fields and 2 records. The fields are: Lifetime_Mean, Avg_class_frequency_total_Mean, Churn_Mean, gender_to_m/f, and Record_Count. The records are: 1 (Lifetime_Mean: 3.775, Avg_class_frequency_total_Mean: 1.893, Churn_Mean: 0.266, gender_to_m/f: M, Record_Count: 2041) and 2 (Lifetime_Mean: 3.673, Avg_class_frequency_total_Mean: 1.865, Churn_Mean: 0.265, gender_to_m/f: F, Record_Count: 1959). The right sidebar shows the 'Streams' tab with a 'Churn' stream. The bottom toolbar includes various nodes like 'Database', 'Var. File', 'Auto Data Prep', 'Select', 'Sample', 'Aggregate', 'Derive', 'Type', 'Filter', 'Graphboard', 'Auto Classifier', 'Auto Numeric', 'Auto Cluster', 'Table', 'Flat File', and 'Database'. The status bar at the bottom indicates 'Server: Local Server' and '199MB / 242MB'.

	Lifetime_Mean	Avg_class_frequency_total_Mean	Churn_Mean	gender_to_m/f	Record_Count
1	3.775	1.893	0.266	M	2041
2	3.673	1.865	0.265	F	1959

Step 5: Partitoin node:

A **Partition Node** in IBM SPSS Modeler is used to split the dataset into separate subsets, such as **training** and **testing** samples. It helps in **model validation** by allowing you to test the model's accuracy on unseen data.

The screenshot displays the IBM SPSS Modeler interface. In the background, a workflow diagram is visible, starting with a 'Table' node connected to 'gym_churn_us.csv', followed by a 'Type' node, a 'Partition' node, and then a 'gender_to_m/f' node, leading to 'active_gym_users'. The 'Partition' node is highlighted, and its configuration dialog is open in the foreground.

The 'Partition' dialog box has two tabs: 'Settings' and 'Annotations'. The 'Settings' tab is active, showing the following configuration:

- Partition field:** Partition
- Partitions:** ☒ Train and test ☐ Train, test and validation
- Training partition size:** 60 (Label: Training, Value: "1_Training")
- Testing partition size:** 40 (Label: Testing, Value: "2_Testing")
- Validation partition size:** 0 (Label: Validation, Value: "3_Validation")
- Total size:** 100%
- Values:** ☐ Use system-defined values ("1", "2" and "3") ☒ Append labels to system-defined values ☐ Use labels as values
- ☒ Repeatable partition assignment
- Seed:** 1234567 (Generate button)
- ☐ Use unique field to assign partitions: [Field Selection]

The dialog box has 'OK', 'Cancel', 'Apply', and 'Reset' buttons at the bottom.

The right sidebar shows the 'Streams' tab with a 'Churn' stream. Below it, the 'CRISP-DM' classes are listed: Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment.

The bottom toolbar includes various nodes and tools: Database, Var. File, Auto Data Prep, Select, Sample, Aggregate, Derive, Type, Filter, Graphboard, Auto Classifier, Auto Numeric, Auto Cluster, Table, Flat File, and Database. The status bar at the bottom indicates 'Server: Local Server' and '204MB / 242MB'.

Step 6: Aggregate Node:

The **Aggregate Node** in IBM SPSS Modeler is used to **summarize data by grouping records** based on key fields.

It helps compute statistics like **mean, sum, count, or maximum** for each group to identify overall trends and patterns.

Stream2* - IBM® SPSS® Modeler

File Edit Insert View Tools SuperNode Extensions Windows

gym_churn_us.csv

Table

Type

Partition

gender_to_m/f

Aggregate

active_gym_users

Table

gender_to_m/f

gender_to_m/f

active_gym_users

Aggregate

Preview

Settings Optimization Annotations

Key fields:

gender_to_m/f

Basic Aggregates

Aggregate fields:

Field	Sum	Mean	Min	Max	SDev	Median	Count	Variance	1st Quartile	3rd Quartile
Churn		<input checked="" type="checkbox"/>								
Lifetime		<input checked="" type="checkbox"/>								
Avg_class_freq...		<input checked="" type="checkbox"/>								

Default mode:☒ Sum☒ Mean☐ Min☐ Max☐ SDev☐ Median☐ Count☐ Variance☐ 1st Quartile☐ 3rd Quartile

New field name extension:Add as:☒ Suffix☐ Prefix

☒ Include record count in field

Record_Count

Aggregate Expressions

Field	Expression

OK Cancel Apply Reset

Favorites Sources Record Ops Field Ops Graphs

Database Var. File Auto Data Prep Select Sample Aggregate Derive Type Filter Graphboard Auto Classifier Auto Numeric Auto Cluster Table Flat File Database

Server: Local Server

205MB / 242MB

Step 7: Train the Model (Run CHAID)

Executed the model stream and generated the CHAID decision tree output.

The screenshot displays the IBM SPSS Modeler interface. The main workspace shows a model stream with the following components: 'gym churn us.csv' (Table) -> 'Type' (Table) -> 'Partition' (Table) -> 'Churn' (Table). A secondary path shows 'active gym users' (Table) -> 'gender to mlt' (Table) -> 'Aggregate' (Table) -> 'Table' (Table). The 'Churn' node is highlighted, indicating it is the active model.

The 'Churn' dialog box is open, showing the 'Model' tab. The 'Predictor Importance' section displays a bar chart for the target 'Churn'. The chart shows the importance of various predictors, with 'Lifetime' being the most important. The 'View' dropdown is set to 'Predictor Importance'.

The 'Model' tab also displays the CHAID decision tree rules:

- Lifetime <= 0 [Mode: 1]
- Lifetime > 0 and Lifetime <= 1 [Mode: 1]
- Lifetime > 1 and Lifetime <= 2 [Mode: 0]
- Lifetime > 2 and Lifetime <= 4 [Mode: 0]
- Lifetime > 4 [Mode: 0]

The bottom of the interface shows the 'Favorites' and 'Sources' tabs, along with a toolbar containing various modeling tools like 'Database', 'Var. File', 'Auto Data Prep', 'Select', 'Sample', 'Aggregate', 'Derive', 'Type', 'Filter', 'Graphboard', 'Auto Classifier', 'Auto Numeric', 'Auto Cluster', 'Table', 'Flat File', and 'Database'. The status bar at the bottom indicates 'Server: Local Server' and '193MB / 300MB'.

Step 8: Filter Node :

A **Filter Node** in IBM SPSS Modeler is used to **include or exclude specific fields** from the dataset. It helps in **removing irrelevant or unwanted variables** before analysis or modeling.

The screenshot displays the IBM SPSS Modeler interface. The main workspace shows a workflow starting with a 'gym_churn_us.csv' file, followed by a 'Table' node, a 'Type' node, a 'Partition' node, and a 'Churn' node. The 'Filter' node is currently selected, and its configuration dialog is open. The dialog shows a list of fields with checkboxes indicating which are included or excluded. The 'Filter' tab is active, showing 16 fields in, 13 filtered, 0 renamed, and 3 out. The 'Annotations' tab is also visible. The bottom toolbar includes various nodes like 'Database', 'Var. File', 'Auto Data Prep', 'Select', 'Sample', 'Aggregate', 'Derive', 'Type', 'Filter', 'Graphboard', 'Auto Classifier', 'Auto Numeric', 'Auto Cluster', 'Table', 'Flat File', and 'Database'. The status bar at the bottom indicates 'Server: Local Server' and '195MB / 300MB'.

Fields: 16 in, 13 filtered, 0 renamed, 3 out

Field	Filter	Field
Group_visits	<input checked="" type="checkbox"/>	Group_visits
Age	<input checked="" type="checkbox"/>	Age
Avg_additional_charges_total	<input checked="" type="checkbox"/>	Avg_additional_charges_total
Month_to_end_contract	<input checked="" type="checkbox"/>	Month_to_end_contract
Lifetime	<input checked="" type="checkbox"/>	Lifetime
Avg_class_frequency_total	<input checked="" type="checkbox"/>	Avg_class_frequency_total
Avg_class_frequency_current...	<input checked="" type="checkbox"/>	Avg_class_frequency_current...
Churn	<input checked="" type="checkbox"/>	Churn
\$R-Churn	<input checked="" type="checkbox"/>	\$R-Churn
\$RC-Churn	<input checked="" type="checkbox"/>	\$RC-Churn

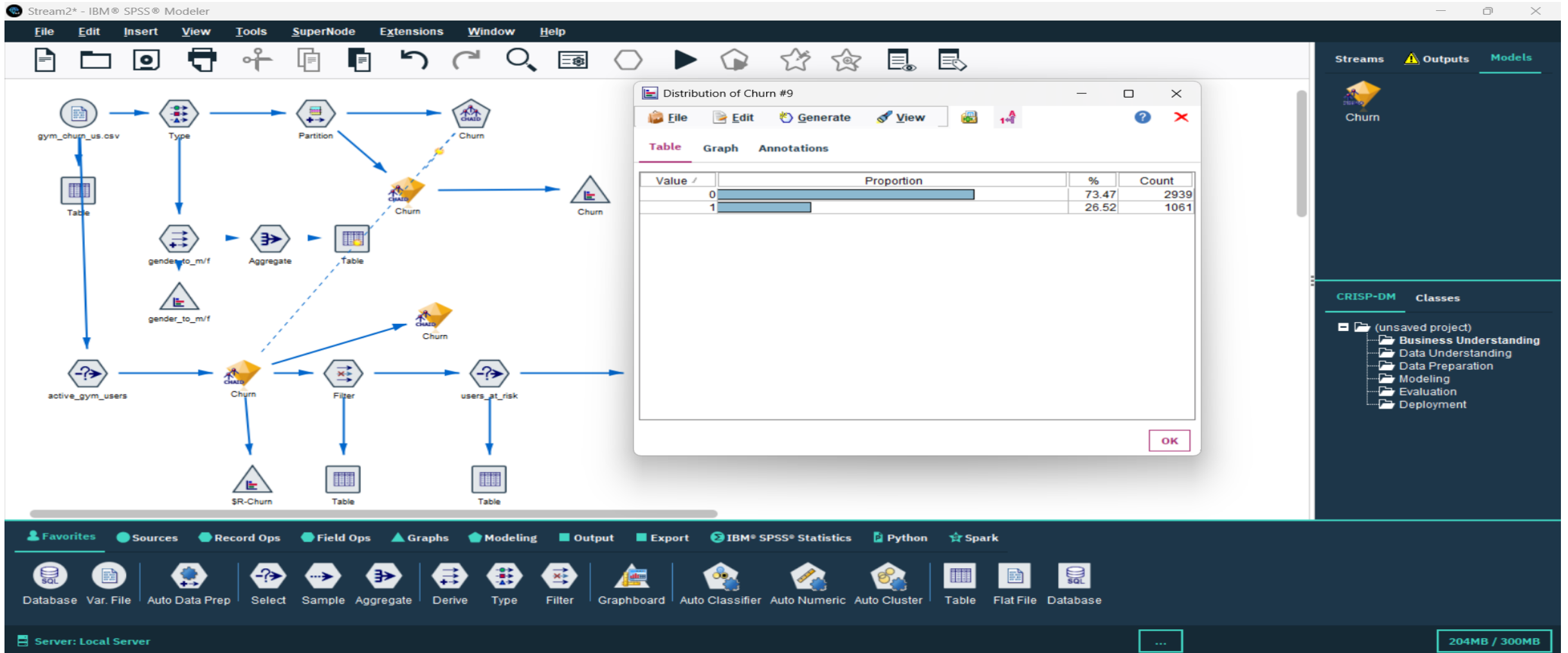
☒ View current fields ☐ View unused field settings

OK Cancel Apply Reset

Step 8: Calculate Churn Rate:

Used Aggregate and Table nodes to compute churn proportions.

- 0 \rightarrow 81.47% (Non-churned)
- 1 \rightarrow 18.53% (Churned)



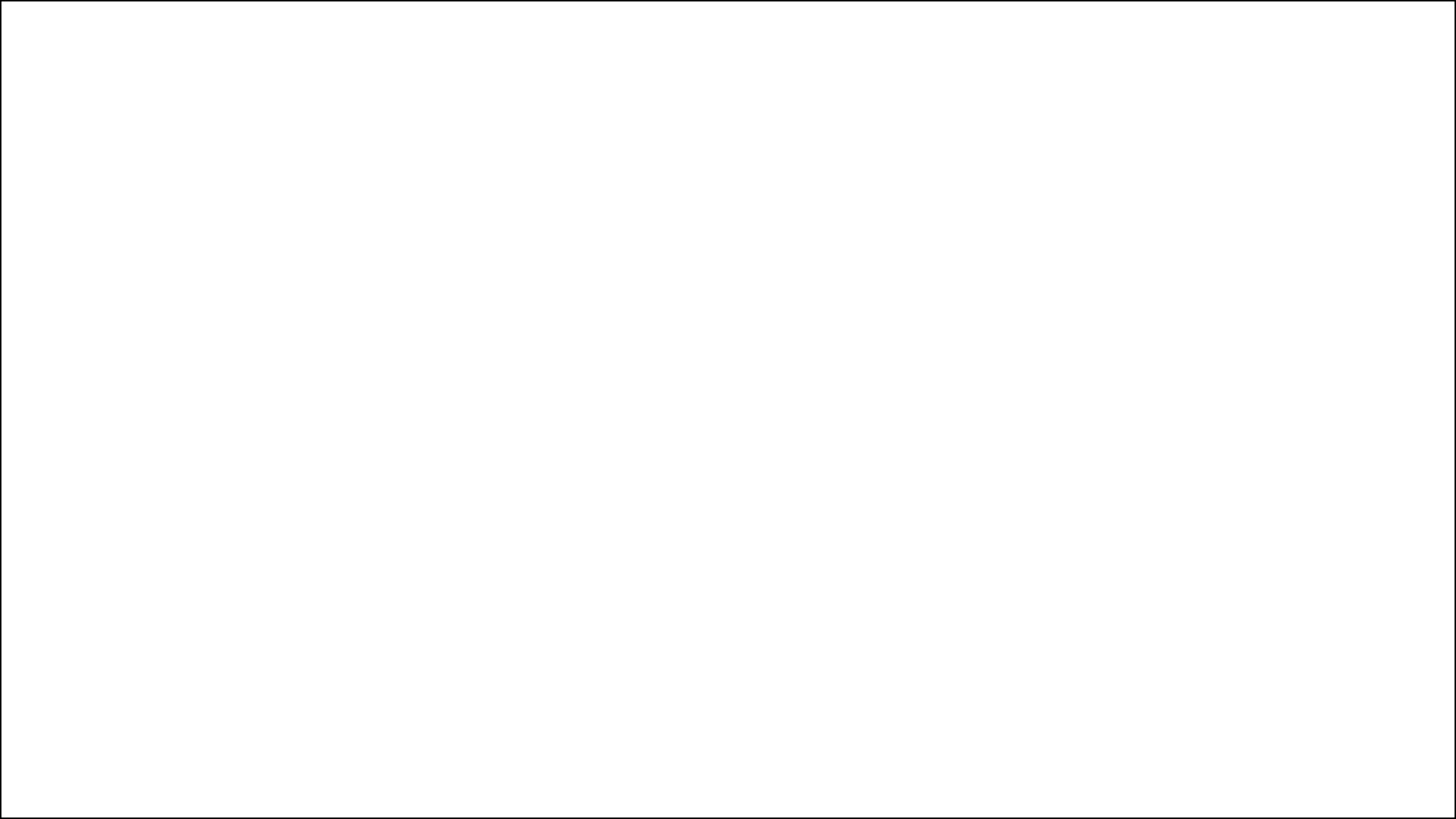


Conclusion

The churn analysis conducted using **IBM SPSS Modeler** provided valuable insights into customer behavior and retention at the gym. Through systematic data preparation and transformation, key variables such as **gender**, **lifetime**, and **average class frequency** were analyzed to understand their relationship with churn. The **Derive Node** was effectively used to convert numeric gender codes into readable labels (“M” and “F”), improving the interpretability of the results.

Further, by using the **Aggregate Node**, important statistical summaries like mean lifetime, average class frequency, and churn rate were computed for each gender group. The analysis revealed that both male and female customers have similar churn rates, but slight variations in engagement and lifetime values. These findings highlight the importance of personalized engagement strategies to reduce member dropout and improve retention.

Overall, the project demonstrates how **IBM SPSS Modeler** can be leveraged to perform data preparation, transformation, and statistical analysis in a structured way. It also emphasizes the role of data-driven decision-making in understanding customer patterns and supporting effective business strategies.



Summary

In summary, this project successfully applied the CHAID decision tree to uncover actionable insights for customer retention. It highlights how data-driven approaches can help banks anticipate churn, improve engagement, and make informed strategic decisions. The knowledge gained from this workflow strengthens analytical proficiency in SPSS Modeler and lays a foundation for future enhancements using advanced machine learning models or automated churn monitoring systems