

The screenshot displays the Altair AI Studio Educational 2024.1.0 interface. The top menu bar includes File, Edit, Process, View, Connections, Settings, Extensions, and Help. Below the menu is a toolbar with icons for file operations and a search bar labeled "Find data, operators...etc".

The main workspace is divided into three panels:

- Repository:** Contains a list of data sources under "Training Resources (containing...)", including Samples, Community Samples, and Local Repository (Local).
- Process:** The central area showing a workflow design. The process flow is: Read CSV (purple) → Set Role (pink) → Multiply (orange) → Decision Tree (green) → Decision Tree (2) (green) → Decision Tree (3) (green). The process is currently at 75% completion.
- Parameters:** A panel on the right showing configuration options for the "Process" operator, including logverbosity (init), logfile, resultfile, random seed (2001), send mail (never), and encoding (SYSTEM). There are also links for "Hide advanced parameters" and "Change compatibility (10.5.000)".

At the bottom, there is a "Help" panel with a "Process" section and a "Synopsis" section. A message at the bottom of the Process panel states: "Leverage the Wisdom of Crowds to get operator recommendations based on your process design!" with a green checkmark and the text "Activate Wisdom of Crowds".

Altair AI Studio Educational 2024.1.0 @ BOOK-43AHMBG3BD

File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators...etc All Studio

Result History

- Tree (Decision Tree (3))
- Tree (Decision Tree (2))
- Tree (Decision Tree)

Zoom

Tree

Node Labels

Edge Labels

Graph

Description

Annotations

Repository

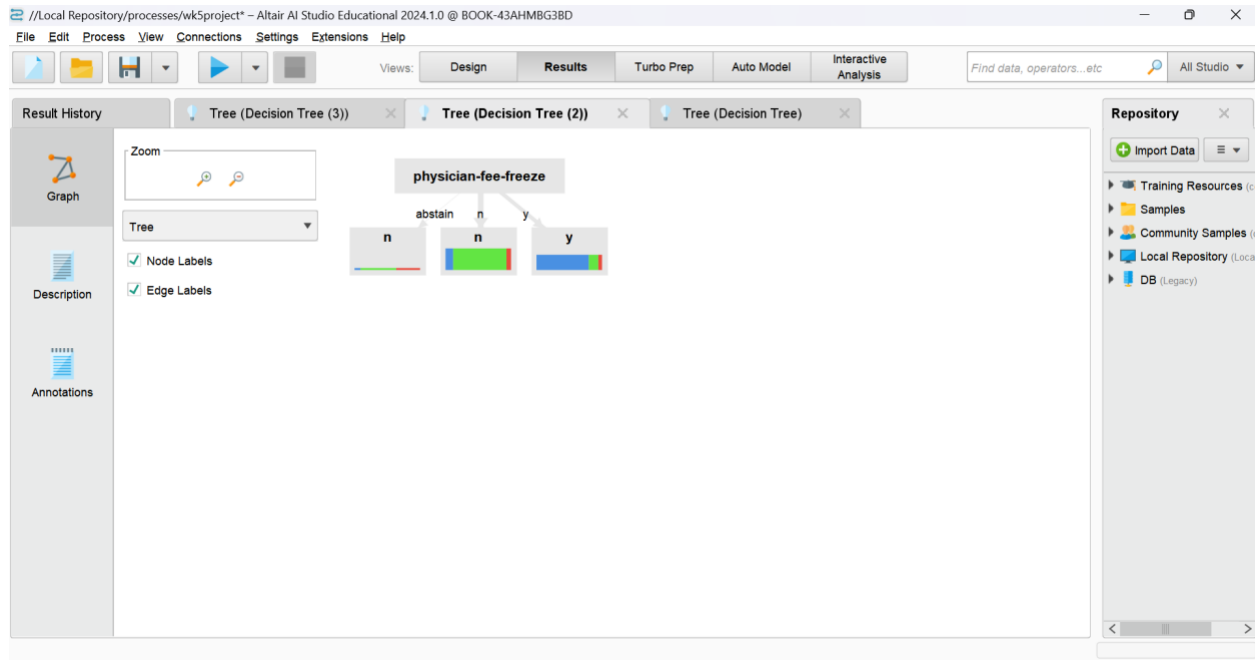
- Import Data
- Training Resources
- Samples
- Community Samples
- Local Repository
- DB (Legacy)

Decision Tree Structure:

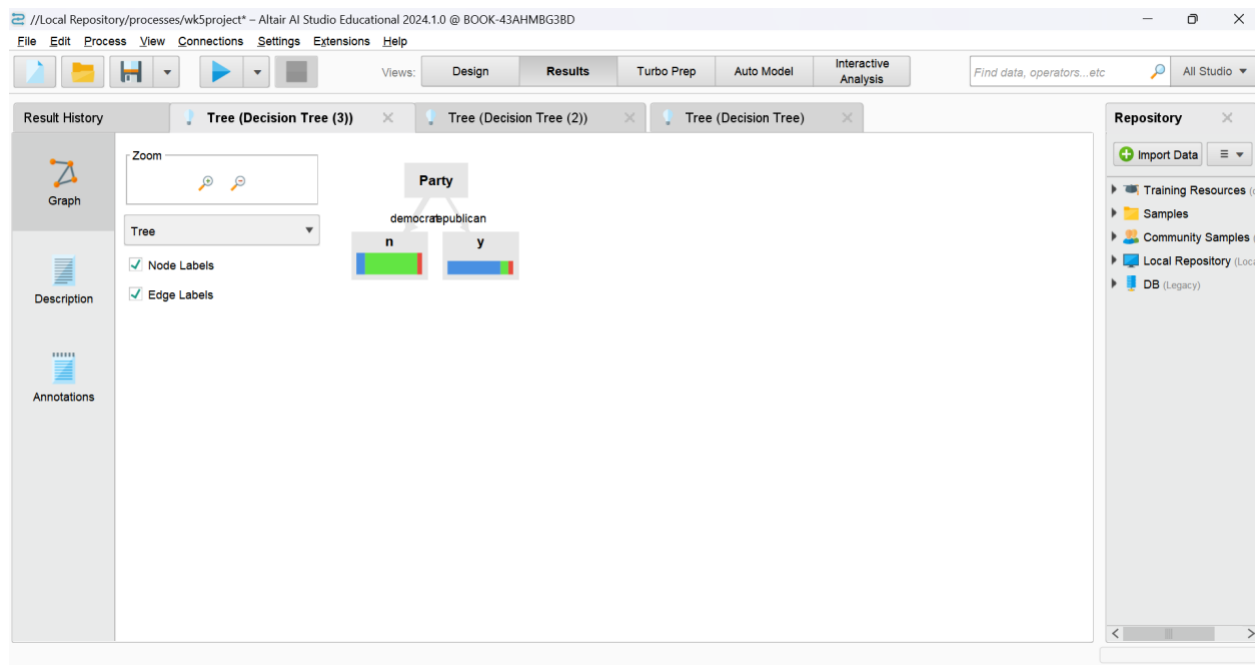
```
graph TD; A[physician-fee-freeze] -- abstain --> B[anti-satellite-test-ban]; A -- n --> C[n]; A -- y --> D[y]; B -- abstain --> E[abstain]; B -- n --> F[n]; B -- y --> G[n];
```

The decision tree visualizes the model's logic. The root node is 'physician-fee-freeze'. If the value is 'abstain', it leads to the 'anti-satellite-test-ban' node. If 'n', it leads to a leaf node 'n'. If 'y', it leads to a leaf node 'y'. The 'anti-satellite-test-ban' node further branches: 'abstain' leads to 'abstain', 'n' leads to 'n', and 'y' leads to 'n'. Each leaf node contains a horizontal bar chart representing the class distribution of the data points that reach that node.

Decision Tree #2 Result



Decision Tree #3 Result



Step 2: Uploaded voter predict data, used parameters/using wk5 lab results for data, the decision tree and naïve bayes

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File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators...etc All Studio

Repository

- Import...
- Training Resources
- Samples
- Community Samples
- Local Repository

Operators

- apply model
- Modeling (1)
 - Time Series (1)
 - Forecasting
 - Apply Forecast
 - Scoring (1)
 - Apply Model

No results were found.

Process

Process 75%

Read CSV Set Role Decision Tree (3)

Read CSV (2) Set Role (2) Apply Model

Leverage the Wisdom of Crowds to get operator recommendations based on your process design!

Activate Wisdom of Crowds

Parameters

Decision Tree (3) (Decision Tree)

- criterion: gain ratio
- maximal depth: 20
- apply pruning: ☐
- apply prepruning: ☒
- minimal gain: 0.1
- minimal leaf size: 2
- minimal size for split: 4
- number of prepruning alternatives: 3
- Hide advanced parameters
- Change compatibility (10.5.000)

Help

--Predict w/ decision tree results

Altair AI Studio Educational 2024.1.0 @ BOOK-43AHMBG3BD

File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators...etc All Studio

Result History

- Tree (Decision Tree (3))
- ExampleSet (Apply Model)

Zoom

Tree

- Node Labels: ☒
- Edge Labels: ☒

Repository

- Import Data
- Training Resources
- Samples
- Community Samples
- Local Repository
- DB (Legacy)

Tree (Decision Tree (3))

```

graph TD
    Party --> |democrat| crime
    Party --> |Republican| physician-fee-freeze
    crime --> |yes| alter-project-cost-share
    crime --> |no| abortion
    alter-project-cost-share --> |yes| abortion
    alter-project-cost-share --> |no| no
    abortion --> |yes| no
    abortion --> |no| no
    physician-fee-freeze --> |yes| abortion
    physician-fee-freeze --> |no| superfund-right-to-act
    superfund-right-to-act --> |yes| no
    superfund-right-to-act --> |no| missile
    missile --> |yes| anti-satellite-test-ban
    missile --> |no| no
    anti-satellite-test-ban --> |yes| duty-free-export
    anti-satellite-test-ban --> |no| no
    duty-free-export --> |yes| adoption-of-the-budget-resolution
    duty-free-export --> |no| no
    adoption-of-the-budget-resolution --> |yes| no
    adoption-of-the-budget-resolution --> |no| yes
  
```

--Predict w/ decision tree results cont.

Altair AI Studio Educational 2024.1.0 @ BOOK-43AHMBG3BD

File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators...etc All Studio

Result History

Tree (Decision Tree (3)) ExampleSet (Apply Model)

Open in Turbo Prep Auto Model Interactive Analysis

Filter (35 / 35 examples): all

Row No.	prediction(e...	confidence(y)	confidence(n)	confidence(...	handicappe...	water-proje...	adoption-of...	physician-fe...	el-salvad
1	y	0.800	0.200	0	n	y	n	y	y
2	y	0.889	0.051	0.060	n	y	n	y	y
3	n	0	1	0	abstain	n	y	y	n
4	y	0.800	0.200	0	n	y	n	y	y
5	y	0.889	0.051	0.060	y	y	n	y	y
6	y	0.889	0.051	0.060	n	n	n	y	y
7	n	0.318	0.647	0.035	y	n	y	n	y
8	n	0.318	0.647	0.035	n	n	n	y	y
9	n	0.318	0.647	0.035	y	n	y	n	n
10	y	0.889	0.051	0.060	n	n	n	y	y
11	y	0.889	0.051	0.060	n	n	n	y	y
12	n	0.039	0.890	0.071	y	n	y	n	n
13	y	0.889	0.051	0.060	n	n	n	y	y

ExampleSet (35 examples, 4 special attributes, 17 regular attributes)

Repository

Import Data

Training Resources (c)

Samples

Community Samples (c)

Local Repository (Local)

DB (Legacy)

--Predict w/ decision tree results cont.

Altair AI Studio Educational 2024.1.0 @ BOOK-43AHMBG3BD

File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators...etc All Studio

Result History

Tree (Decision Tree (3)) ExampleSet (Apply Model)

Name	Type	Missing	Statistics	Filter (21 / 21 attributes):	Search for Attributes
Prediction prediction(education-spending)	Polynomial	0	Least abstain (1)	Most n (18)	Values n (18), y (16), ...[1 n
Confidence_y confidence(y)	Real	0	Min 0	Max 0.889	Average 0.457
Confidence_n confidence(n)	Real	0	Min 0	Max 1	Average 0.462
Confidence_abstain confidence(abstain)	Real	0	Min 0	Max 1	Average 0.080
handicapped-infants	Polynomial	0	Least abstain (2)	Most n (20)	Values n (20), y (13), ...[1 n
water-project-cost-sharing	Polynomial	0	Least abstain (2)	Most n (17)	Values n (17), y (16), ...[1 n
adoption-of-the-budget-resolution	Polynomial	0	Least abstain (1)	Most y (20)	Values y (20), n (14), ...[1 n

Showing attributes 1 - 21

Examples: 35 Special Attributes: 4 Regular Attributes: 17

Repository

Import Data

Training Resources (c)

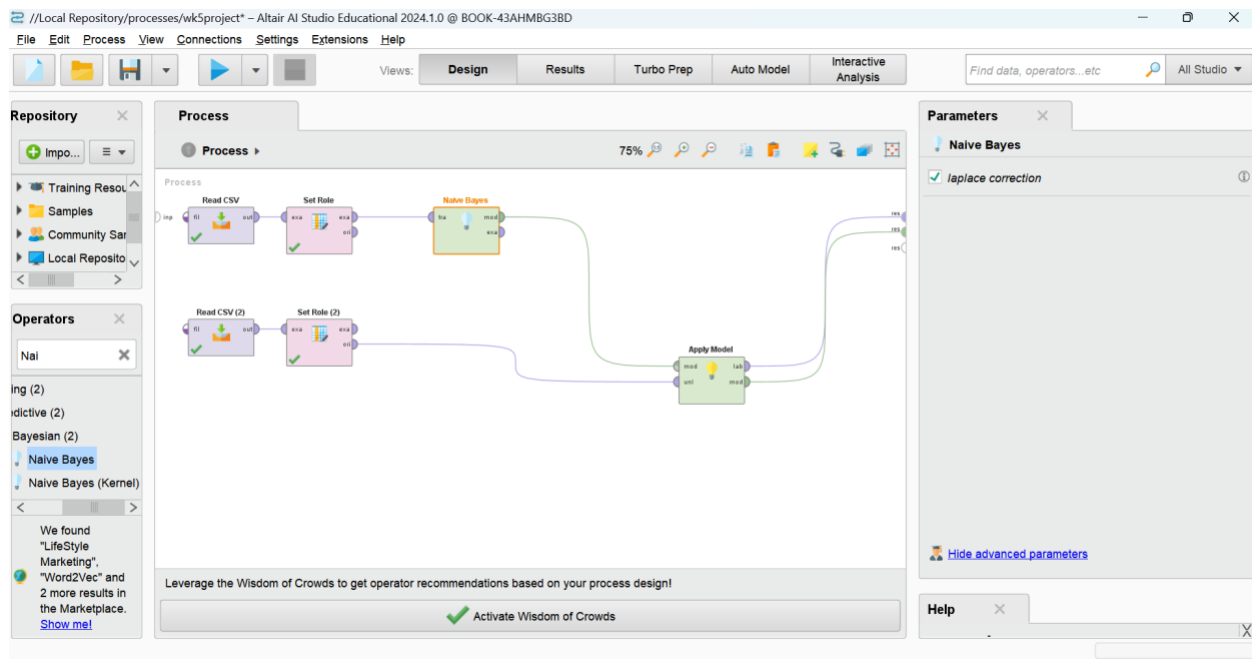
Samples

Community Samples (c)

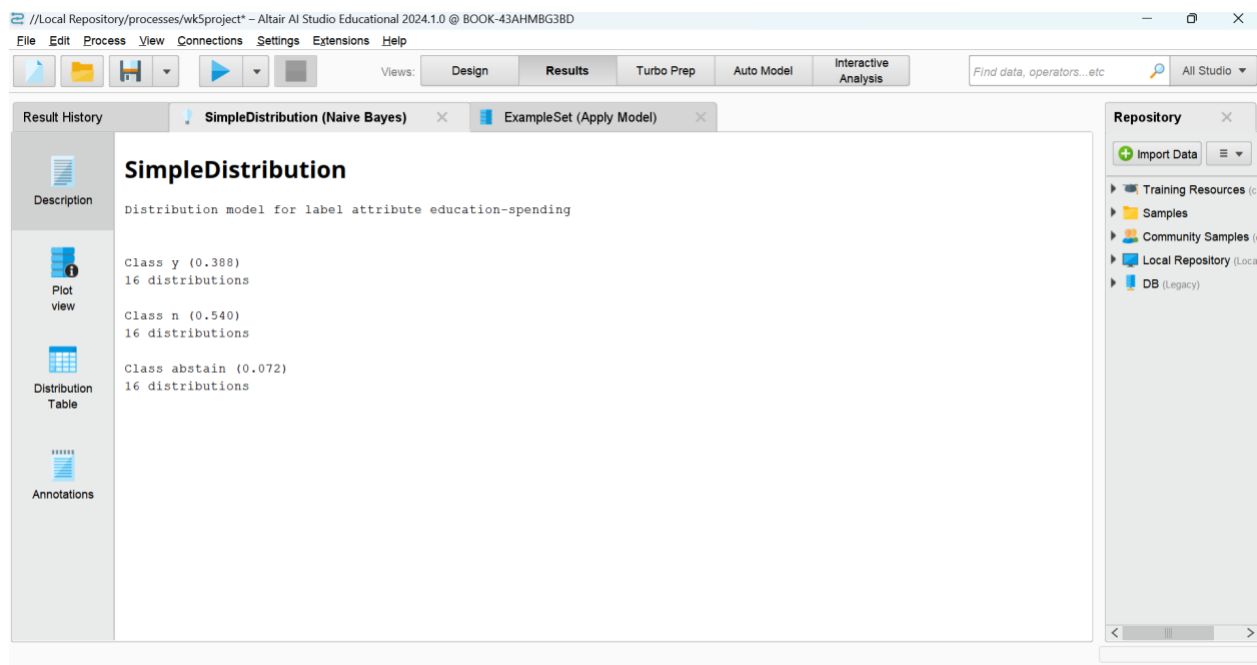
Local Repository (Local)

DB (Legacy)

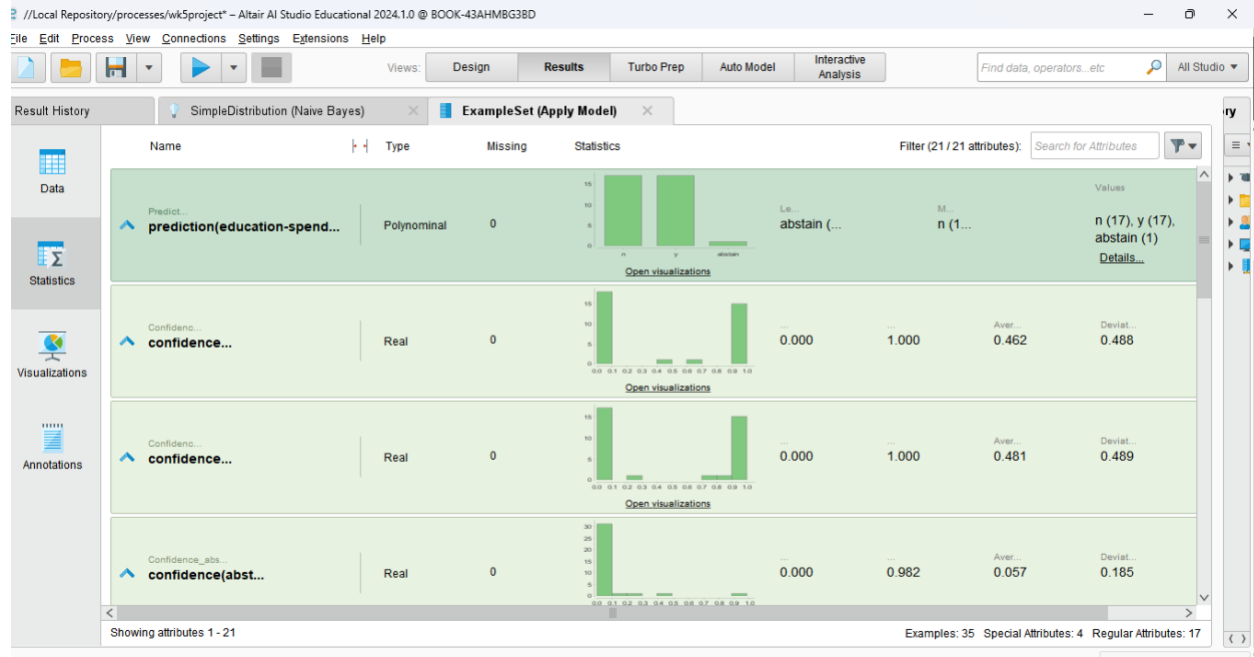
Step 3: Replace the decision tree with naïve bayes with laplace correction



--Predict w/ naïve bayes result cont.



--Predict w/ naïve bayes result cont.



Step 4: We cannot apply a neural network to our data because “Neural Net implementations only work on numeric values”

--should we look at wk8 and see if those methods would apply to this project?

Since the prediction dataset doesn't have actual values for Educational Spending (we are predicting them), we should evaluate the models' performance on the training dataset to get metrics like accuracy, precision, recall, and the confusion matrix.

Step 5: Compare decision tree and naïve bayes, using wk6 lab results for comparing models and splitting data

//Local Repository/processes/wk5project* - Altair AI Studio Educational 2024.1.0 @ BOOK-43AHMBG3BD

File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators... etc All Studio

Repository

- Import Data
- Training Resources (connect)
- Samples
- Community Samples (connect)
- Local Repository (Local)

Operators

Performance

- Sliding Window Validation
- Validation (20)
 - Performance (18)
 - Predictive (7)
 - Performance (Classification)
 - Performance (Binary)
 - Performance (Regression)
 - Performance (Cost)
 - Performance (Ranking)

No results were found.

Process

Process

75%

Process

Read CSV (2) Set Role (2) Multiply Validation (2) Validation (2) Apply Model

Naive Bayes Decision Tree (3)

Leverage the Wisdom of Crowds to get operator recommendations based on your process design!

Activate Wisdom of Crowds

Parameters

Process

- logverbosity: init
- logfile:
- resultfile:
- random seed: 2001
- send mail: never
- encoding: SYSTEM

Hide advanced parameters

Change compatibility (10.5.000)

Help

--Split Validation #1 naïve bayes

//Local Repository/processes/wk5project* - Altair AI Studio Educational 2024.1.0 @ BOOK-43AHMBG3BD

File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators... etc All Studio

Repository

- Import Data
- Training Resources (connect)
- Samples
- Community Samples (connect)
- Local Repository (Local)

Operators

Performance

- Sliding Window Validation
- Validation (20)
 - Performance (18)
 - Predictive (7)
 - Performance (Classification)
 - Performance (Binary)
 - Performance (Regression)
 - Performance (Cost)
 - Performance (Ranking)

No results were found.

Process

Process Validation

Training Testing

Naive Bayes (2) Apply Model (2) Performance

Leverage the Wisdom of Crowds to get operator recommendations based on your process design!

Activate Wisdom of Crowds

Parameters

Validation (Split Validation)

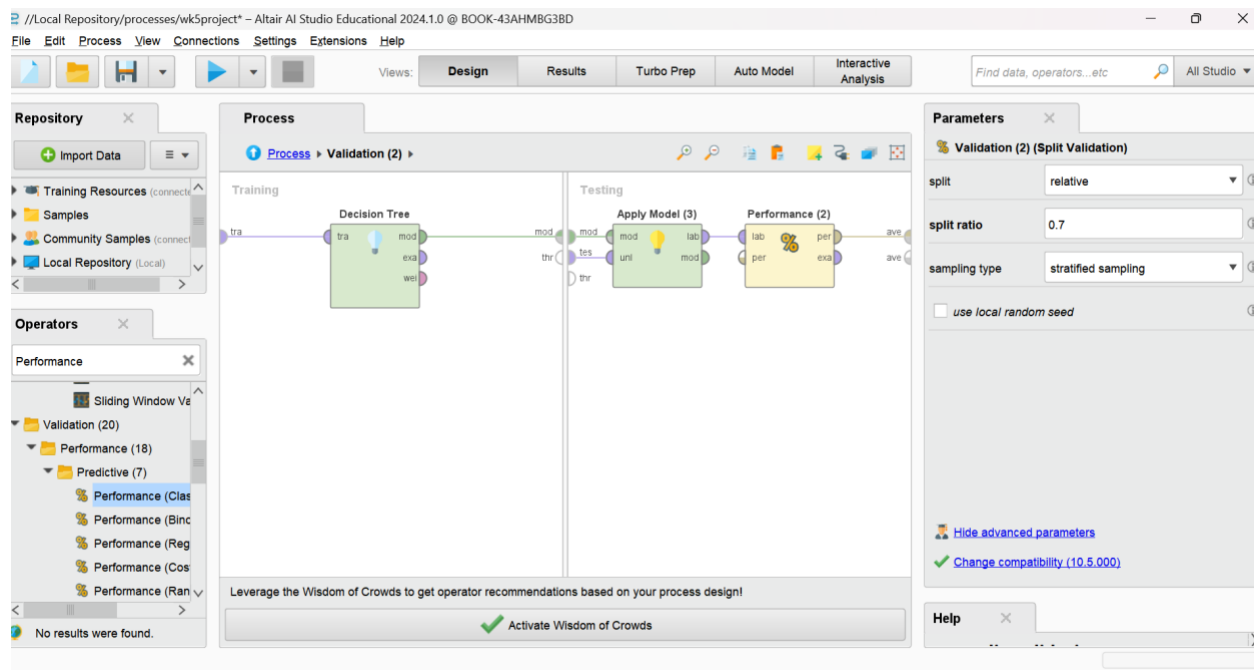
- split: relative
- split ratio: 0.7
- sampling type: stratified sampling
- use local random seed:

Hide advanced parameters

Change compatibility (10.5.000)

Help

--Split Validation #2 decision tree



--Results #1 naïve bayes

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File Edit Process View Connections Settings Extensions Help

Views: Design Results Turbo Prep Auto Model Interactive Analysis

Find data, operators...etc All Studio

Result History

PerformanceVector (Performance (2)) PerformanceVector (Performance)

Criterion: accuracy

Table View Plot View

accuracy: 80.83%

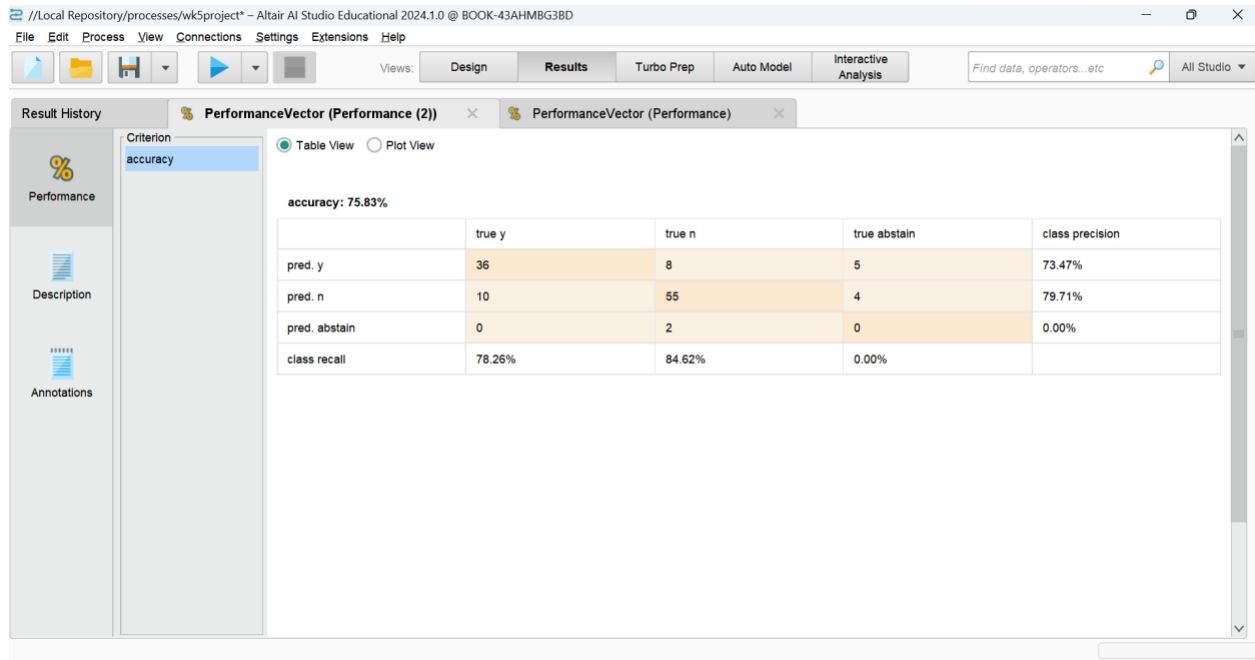
	true y	true n	true abstain	class precision
pred. y	40	9	0	81.63%
pred. n	5	55	7	82.09%
pred. abstain	1	1	2	50.00%
class recall	86.96%	84.62%	22.22%	

Accuracy: 80.83%

Recall:

Precision:

--Results #2 decision tree



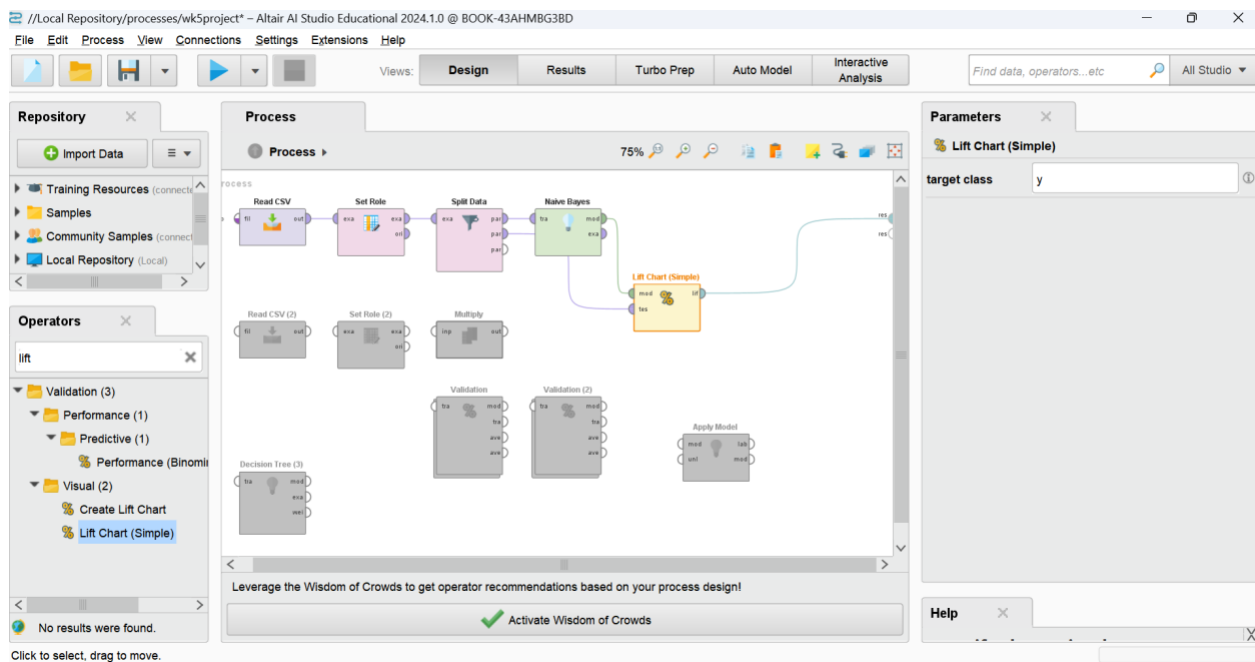
Accuracy: 75.83%

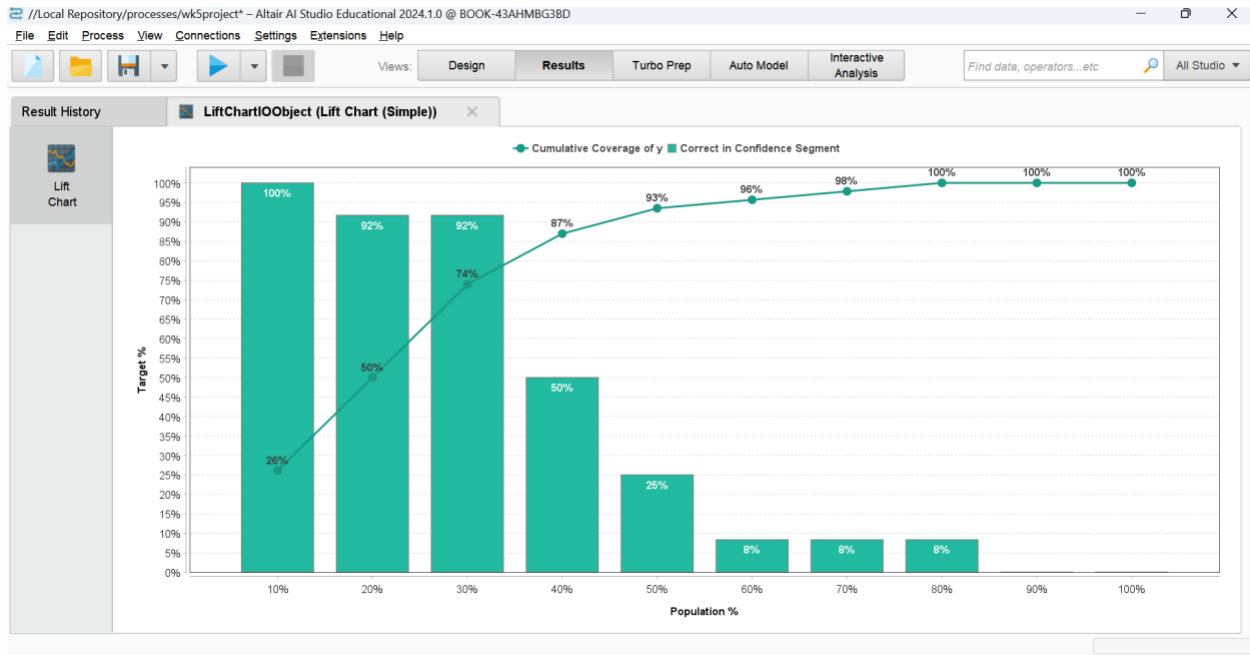
Recall:

Precision:

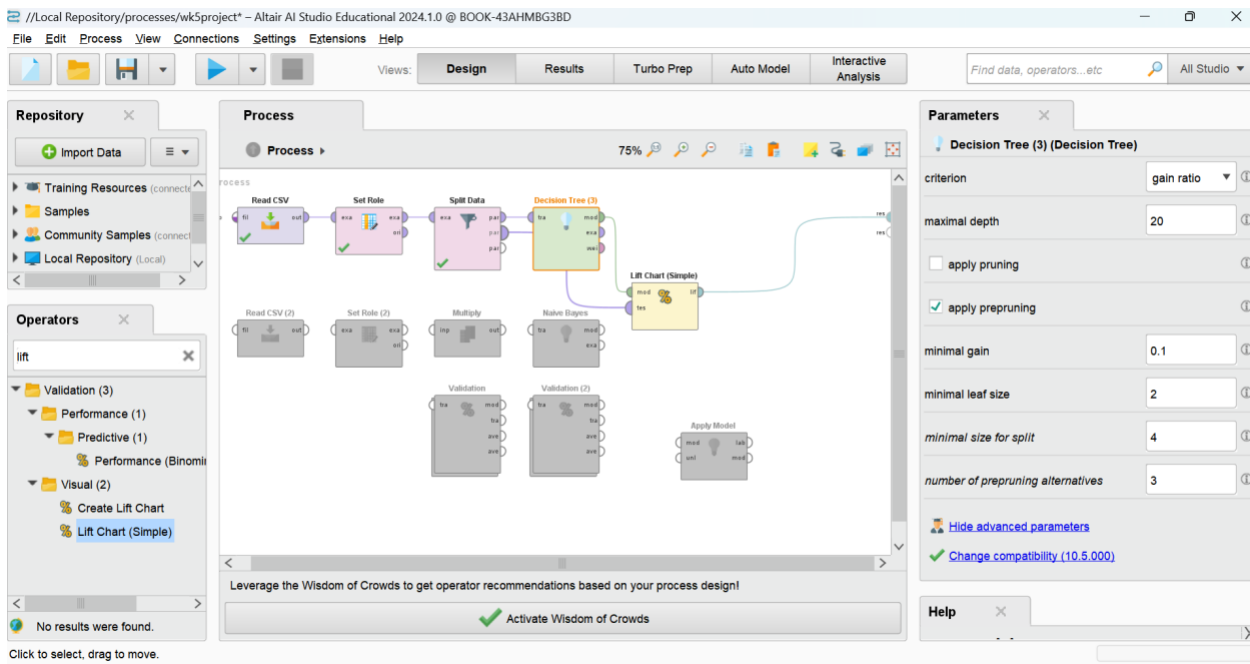
This shows the Naïve Bayes Model is more accurate than the Decision Tree Model.

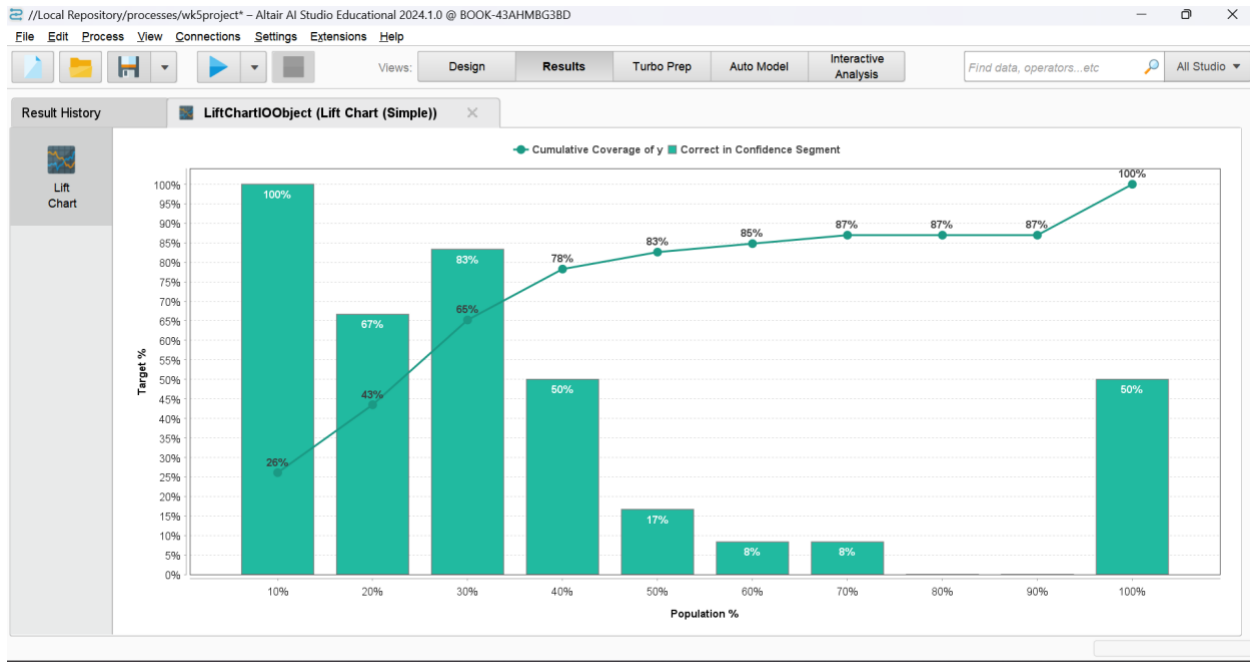
Lift Chart Naïve Bayes





Lift Chart Decision Tree





This tells you that by looking at just the top 10% of the data, the models already captured 26% of all the "Yes" votes. This is a good indication that the models are effectively prioritizing the most likely "Yes" voters early on. (Since both models show similar Lift Chart performance (100% confidence and 26% coverage), we can also compare them on other metrics like accuracy, precision, and recall to determine which is better overall.)