

# Using IBM SPSS Modeler to prepare students for a career in Business Analytics

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Singapore University of Social Sciences

# Agenda

- Types of Students Pursuing Analytics in the School of Business, SUSS
- IBM SPSS Modeler
- Reasons for choosing IBM SPSS Modeler
- Challenges in using IBM SPSS Modeler

# Students pursuing Analytics in the School of Business, SUSS



**Part-Time  
Programmes  
Working Adults**

# Part-time (PT) Programmes in the Business Cluster at SUSS

## 8 Part-time Programmes in the Business Cluster

- Bachelor of Accountancy
- Bachelor of Science in Business
- Bachelor of Science in Business Analytics
- Bachelor of Science in Finance
- Bachelor of Science in Marketing
- Bachelor of Science in Logistics & Supply Chain Management
- Bachelor of Science in Management & Security Studies
- Bachelor of Human Resource Management

# Business Analytics PT Curriculum

- Started : July 2007
- Total number of graduates(till Dec 2018) = 308
- Most finish the programme in 3.5 to 4 years; 85% with polytechnic diploma

Types of courses	BSc in Business Analytics Basic Degree Total 130 cu (26 courses)
SUSS Core	10 cu (3 courses)
Compulsory Business	40cu (8 courses)
Compulsory Analytics	45 cu (9 courses)
Elective Analytics	25 cu(5 courses)
Business Analytics Applied Project	10 cu(1 course)

# Business Analytics PT Curriculum – Basic Degree

## Major Compulsory Analytics Courses (9 courses)

ANL201 Data Visualisation for Business  
ANL321 Statistical Methods  
ANL303 Fundamentals of Data Mining  
ANL305 Association & Clustering  
ANL307 Predictive Modelling  
ANL309 Business Analytics Applications  
ANL311 Selected Topics in Business Analytics(Text Mining)  
ANL317 Business Forecasting  
ANL355 Applied Operations Research

## Major Elective Analytics Courses (5 courses)

Choose 5 courses from the following:

ANL251 Python Programming  
ANL351 SAS Programming and its Application  
ANL451 Advanced Statistical Methods  
BUS351 Operations Management  
BUS353 Project Management  
BUS357 Starting & Managing a Business  
BIS388 Independent Study  
ICT330 Database Management Systems  
MKT355 Multivariate Analysis  
MKT390 Marketing Research

# Students pursuing Analytics in the School of Business, SUSS



**Part-Time  
Programmes  
Working Adults**



**Full-Time  
Programmes  
Fresh School  
Leavers**

# Full-time Programmes in the Business Cluster at SUSS

## 6 Full-time Programmes in the Business Cluster

- Bachelor of Accountancy
- Bachelor of Science in Business Analytics with Minor
- Bachelor of Science in Supply Chain Management with Minor
- Bachelor of Science in Finance with Minor
- Bachelor of Science in Marketing with Minor
- Bachelor of Human Resource Management with Minor



# Business Analytics FT Curriculum

- Started : July 2017
- 88% with polytechnic diploma
- First batch of graduate expected in 2021

Types of courses	BSc in Business Analytics with Minor Honours Degree Total 200 cu
SUSS Core Curriculum	40 cu
Major	100 cu
- Compulsory Business (10 courses)	- 50 cu
- Compulsory Analytics (9 courses)	- 45 cu
- Elective Analytics (1 course)	- 5 cu
Business Analytics Applied Project + Strategy (2 courses)	20 cu
Minor (8 courses)	40 cu

# Business Analytics FT Curriculum

## Major Compulsory Analytics Courses (9 courses)

ANL201 Data Visualisation for Business  
ANL321 Statistical Methods  
ANL303 Fundamentals of Data Mining  
ANL305 Association & Clustering  
ANL307 Predictive Modelling  
ANL309 Business Analytics Applications  
ANL311 Selected Topics in Business Analytics  
ANL317 Business Forecasting  
ANL355 Applied Operations Research

## Major Elective Analytics Courses (1 course)

Choose 1 course from the following:

ANL251 Python Programming  
ANL351 SAS Programming and its Application  
ANL451 Advanced Statistical Methods  
ICT330 Database Management Systems  
MKT355 Multivariate Analysis  
MKT390 Marketing Research

# Business Analytics FT Curriculum

## Minors

Minor Courses		
	▼ Accountancy	▼ Management
	▲ Algorithmic Development	▼ Marketing
	MINOR CORE (20 cu)	▼ Military Studies
	• MTH107 Calculus I	▼ Mobile Application Development
	• MTH108 Calculus II	▼ Music Education
	• MTH207 Linear Algebra	▼ Organisation Management
	• MTH208 Advanced Linear Algebra	▼ Outdoor Education
	MINOR ELECTIVE (20 cu)	▼ Physical Education
	• MTH217 Numerical Methods and Advanced Calculus	▼ Political Science
	• MTH305 Principles of Applied Probability	▼ Procurement Management
	• MTH306 Further Applied Probability	▼ Psychology
	• MTH355 Basic Mathematical Optimization	▼ Public Sector Service Management
	• MTH356 Advanced Mathematical Optimization	▼ Security Studies
	▼ Art Education	▼ Sociology
	▼ Business	▼ Supply Chain Management
	▼ Chinese Language	▼ Tamil Language
	▼ Communication	▼ Translation
	▼ Contemporary China Studies	▼ Work Study
	▼ Digital Media	
	▼ English Language	
	- . . . . .	

# Full-time Programmes in Business Cluster at SUSS

## 6 Full-time Programmes in the Business Cluster

- Bachelor of Accountancy
- Bachelor of Science in Business Analytics with Minor
- Bachelor of Science in Supply Chain Management with Minor
- Bachelor of Science in Finance with Minor
- Bachelor of Science in Marketing with Minor
- Bachelor of Human Resource Management with Minor

### ▲ Analytics

#### MINOR CORE (30 cu)

- ANL303 Fundamentals of Data Mining
- ANL305 Association and Clustering
- ANL307 Predictive Modelling
- ANL310 Business Analytics Applications and Issues
- ANL311 Selected Topics in Business Analytics
- BUS107 Quantitative Methods

#### MINOR ELECTIVE (10 cu)

- ANL201 Data Visualisation for Business
- ANL251 Python Programming
- ANL317 Business Forecasting
- ANL321 Statistical Methods
- ANL351 SAS Programming and its Application
- ANL451 Advanced Statistical Methods
- ICT330 Database Management Systems
- MKT355 Multivariate Analysis

# Students pursuing Analytics in the School of Business, SUSS



**Part-Time  
Programmes  
Working Adults**



**Full-Time  
Programmes  
Fresh School  
Leavers**



**Continuing  
Education  
Working Adults**

# ISCA–SUSS Business Analytics Certification Programme

The modular courses offered in the Certification Programme are highly relevant to accounting and finance professionals who play a key role in data-driven decision making. The courses cover the fundamental knowledge of data mining, statistics and predictive modelling, to in-depth knowledge such as data visualisation, business forecasting, business analytics applications and data- mining models. Individuals will benefit from the flexible, applied learning approach of the Certification Programme.

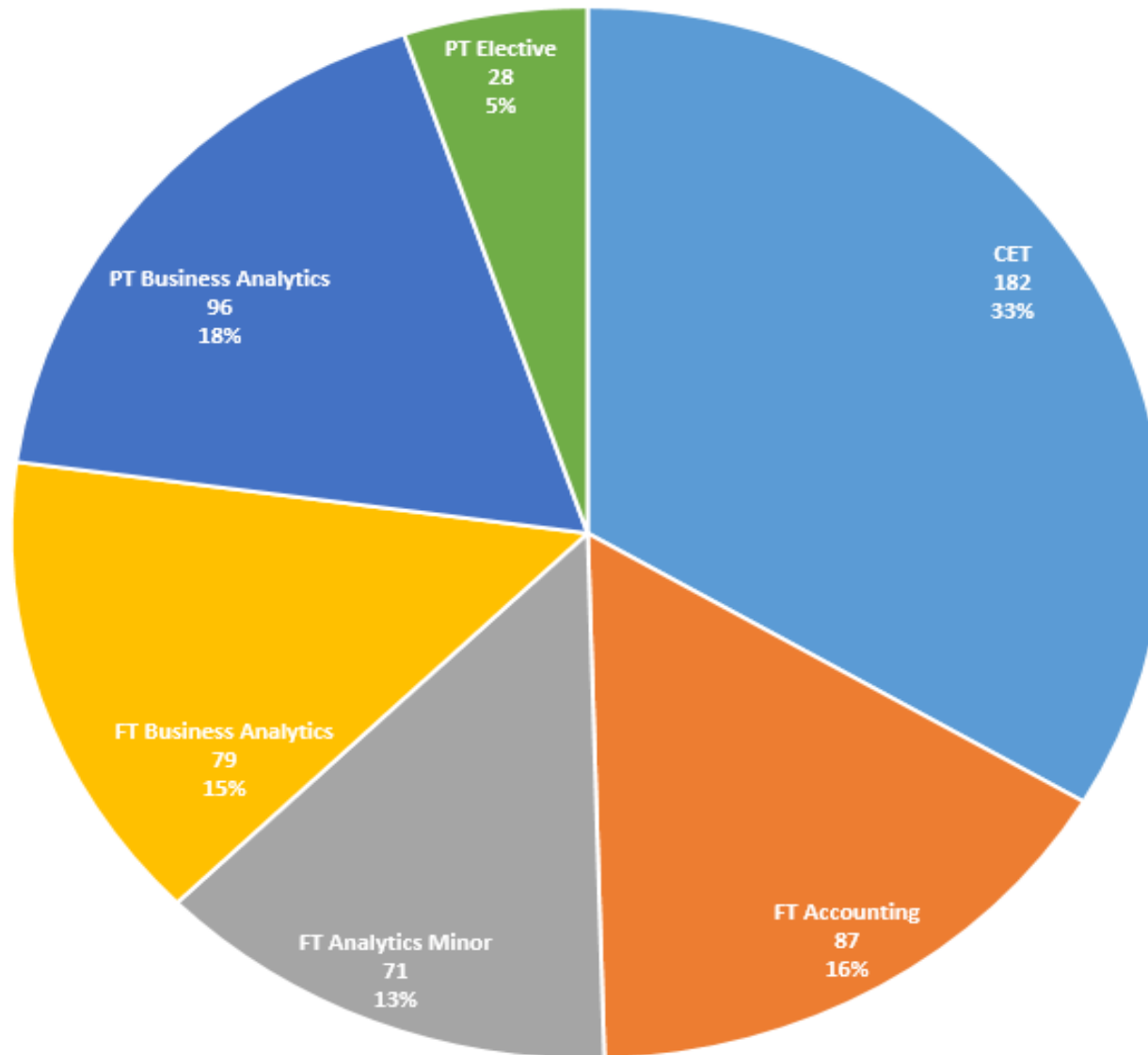
ISCA members have the opportunity to achieve two certificates, the ISCA-SUSS Certificate in Business Analytics and ISCA-SUSS Specialist Certificate in Business Analytics.

Certificate	Courses
<b>ISCA-SUSS Certificate in Business Analytics</b>	<b>Compulsory Module (5CU)</b> <a href="#">ANL303 Fundamentals of Data Mining</a>  <b>Elective Modules (10CU)</b> <a href="#">ANL201 Data Visualisation for Decision Making</a> <a href="#">ANL305 Association and Clustering</a> <a href="#">ANL307 Predictive Modelling</a> <a href="#">ANL321 Statistical Methods</a>
<b>ISCA-SUSS Specialist Certificate in Business Analytics</b>	<b>Compulsory Module (20CU)</b> <a href="#">ANL303 Fundamentals of Data Mining</a> <a href="#">ANL305 Association and Clustering</a> <a href="#">ANL307 Predictive Modelling</a> <a href="#">ANL321 Statistical Methods</a>  <b>Elective Modules (20CU)</b> <a href="#">ANL201 Data Visualisation for Decision Making</a> <a href="#">ANL309 Business Analytics Applications</a> <a href="#">ANL311 Selected Topics in Business Analytics</a> <a href="#">ANL317 Business Forecasting</a> <a href="#">ANL488 Business Analytics Applied Project</a>

For non-ISCA member, please click [here](#).

CET	FT Accounting	FT Analytics Minor	FT Business Analytics	PT Business Analytics	PT Elective
182	87	71	79	96	28

Number of students taking ANL303 Fundamentals of Data Mining in 2019 (n=543)



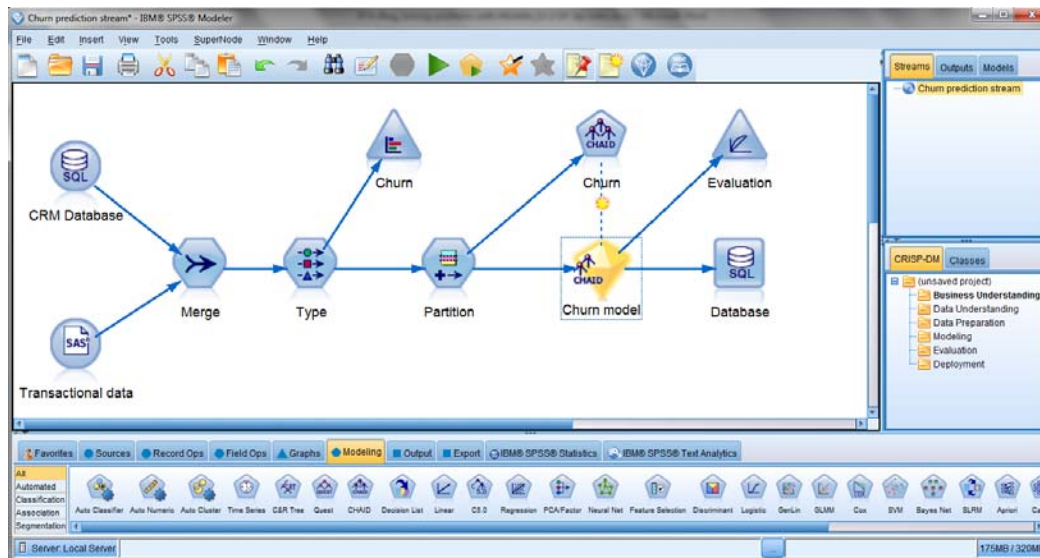
# Analytics Courses and Software Used

Analytics Courses	Analytics Area	Software
ANL201 Data Visualisation for Business	Visualisation	Tableau
ANL303 Fundamentals in Data Mining	Data Mining	IBM SPSS Modeler
ANL305 Association and Clustering	Data Mining	IBM SPSS Modeler
ANL307 Predictive Modelling	Data Mining	IBM SPSS Modeler
ANL309 Business Analytics Application	Data Mining	IBM SPSS Modeler
ANL311 Selected Topics in Business Analytics	Text Mining/Data Mining	IBM SPSS Modeler
ANL317 Business Forecasting	Forecasting	SAS Enterprise Guide/SAS Forecast Studio
ANL321 Statistical Methods	Statistics	SAS JMP
ANL251 Python Programming	Programming	Python
ANL351 SAS Programming and its Application	Programming	SAS Enterprise Guide
ANL355 Applied Operations Research	Optimisation	Excel Add-In - Solver
ANL451 Advanced Statistical Methods	Statistics	R Studio
ANL488 Business Analytics Applied Project	Chosen by student	Chosen by student



# IBM SPSS Modeler

- Commercial data mining workbench aka Clementine and PASW Modeler - Not SPSS Statistics!
- Used in 5 Analytics courses with extensive hands-on and in assessments such as group-based assignments and examinations since 2008.
- Student's choice to use it for their individual ANL488 Business Analytics Applied Project



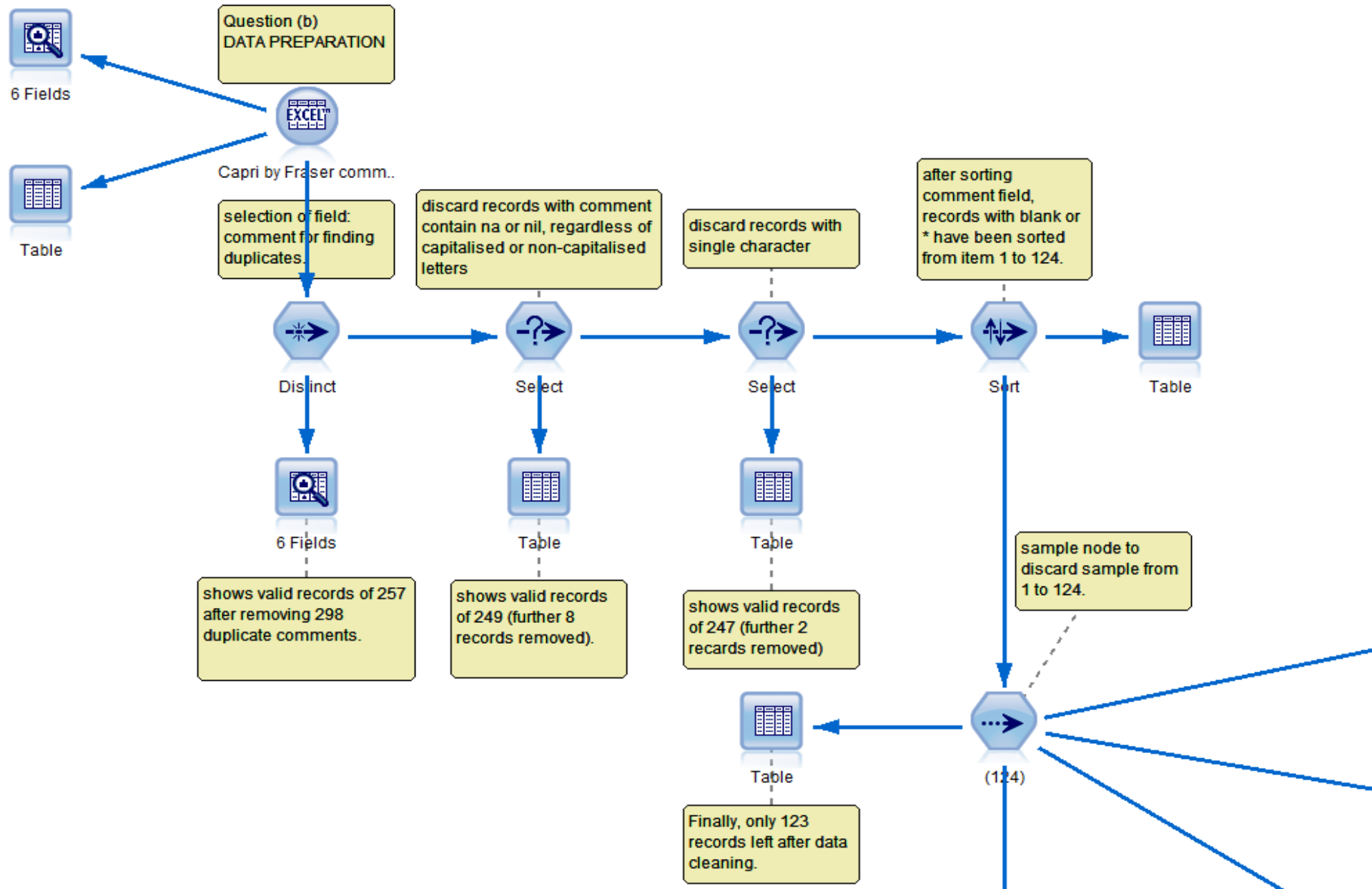
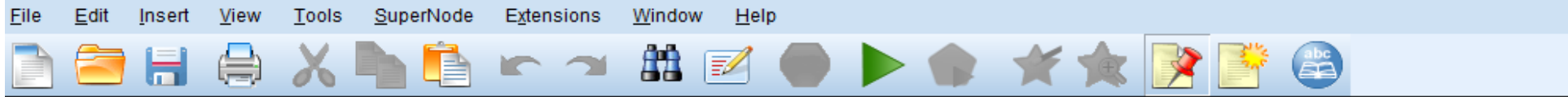
## Release history [\[ edit \]](#)

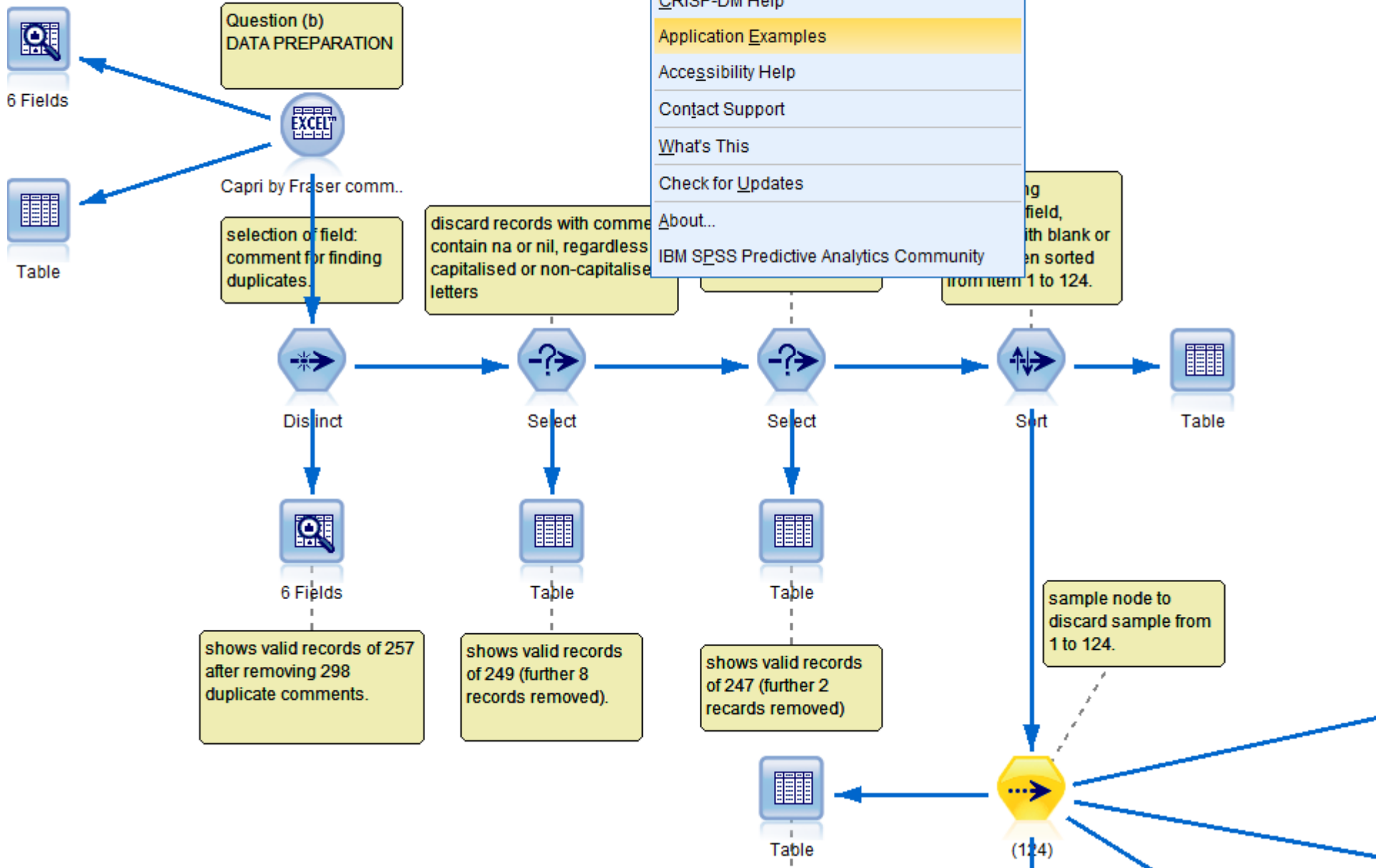
- Clementine 1.0 – June 1994 by ISL<sup>[10]</sup> ← Acquired by SPSS
- Clementine 5.1 – Jan 2000
- Clementine 12.0 – Jan 2008
- PASW Modeler 13 (formerly Clementine) – April 2009
- IBM SPSS Modeler 14.0 – 2010 ← Acquired by IBM
- IBM SPSS Modeler 14.2 – 2011
- IBM SPSS Modeler 15.0 – June 2012
- IBM SPSS Modeler 16.0 – December 2013
- IBM SPSS Modeler 17.0 – March 2015
- IBM SPSS Modeler 18.0 – March 2016<sup>[11]</sup>
- IBM SPSS Modeler 18.1 – June 2017<sup>[12]</sup>
- IBM SPSS Modeler 18.2 – March 2019

Taken from Wikipedia

# Reasons for choosing IBM SPSS Modeler

- Easy to use - very visual; no programming; Help file with numerous application examples in fraud detection, customer segmentation, credit scoring, etc.





# Application examples

While the data mining tools in SPSS® Modeler can help solve a wide variety of business and organizational problems, the application examples provide brief, targeted introductions to specific modeling methods and techniques. The data sets used here are much smaller than the enormous data stores managed by some data miners, but the concepts and methods that are involved are scalable to real-world applications.

To access the examples, click **Application Examples** on the Help menu in SPSS Modeler.

The data files and sample streams are installed in the Demos folder under the product installation directory. For more information, see [Demos Folder](#).

The following examples are available:

- [Introduction to Modeling](#)
- [Automated Modeling for a Flag Target](#)
- [Automated Modeling for a Continuous Target](#)
- [Automated Data Preparation \(ADP\)](#)
- [Preparing Data for Analysis \(Data Audit\)](#)
- [Drug Treatments \(Exploratory Graphs\) \(SE 0\)](#)

# Telecommunications Churn (Binomial Logistic Regression)

Logistic regression is a statistical technique for classifying records based on values of input fields. It is analogous to linear regression but takes a categorical target field instead of a numeric one.

This example uses the stream named *telco\_churn.str*, which references the data file named *telco.sav*. These files are available from the *Demos* directory of any IBM® SPSS® Modeler installation. This can be accessed from the IBM SPSS Modeler program group on the Windows Start menu. The *telco\_churn.str* file is in the *streams* directory.

For example, suppose a telecommunications provider is concerned about the number of customers it is losing to competitors. If service usage data can be used to predict which customers are liable to transfer to another provider, offers can be customized to retain as many customers as possible.

This example focuses on using usage data to predict customer loss (churn). Because the target has two distinct categories, a binomial model is used. In the case of a target with multiple categories, a multinomial model could be created instead. See the topic [Classifying Telecommunications Customers \(Multinomial Logistic Regression\)](#) for more information.

Next

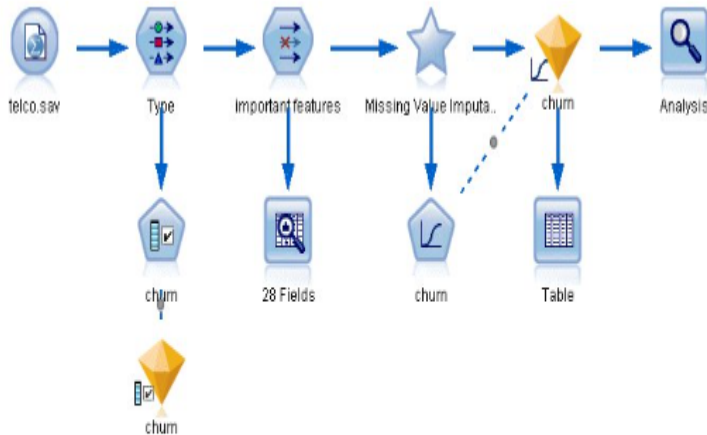
→ [Building the Stream](#)

→ [Browsing the Model](#)

# Building the Stream

1. Add a Statistics File source node pointing to *telco.sav* in the *Demos* folder.

Figure 1. Sample stream to classify customers using binomial logistic regression



2. Add a Type node to define fields, making sure that all measurement levels are set correctly. For example, most fields with values 0 and 1 can be regarded as flags, but certain fields, such as gender, are more accurately viewed as a nominal field with two values.

Figure 2. Setting the measurement level for multiple fields



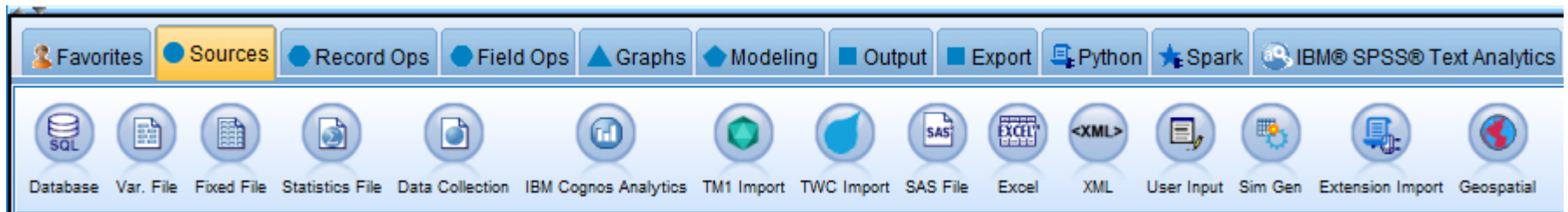
# Reasons for choosing IBM SPSS Modeler

- Easy to use - very visual; no programming; Help file with numerous application examples in fraud detection, customer segmentation, credit scoring, etc.
- Comprehensive data mining workbench



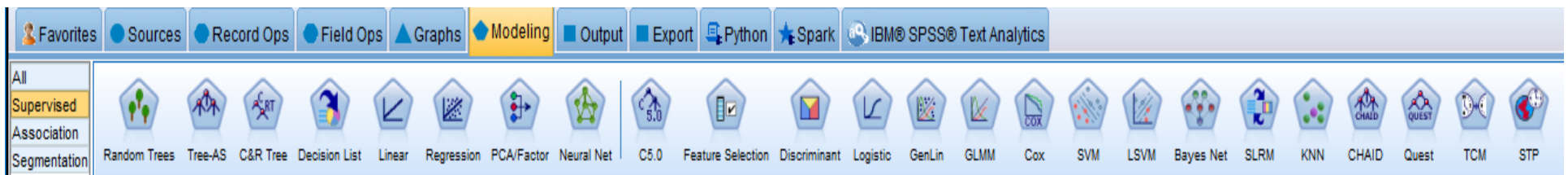
# Comprehensive Data Mining Workbench

1. Each palette tab contains a collection of related nodes used for different phases of stream operations, such as:
  - a) Sources: to bring data into the data mining stream;
  - b) Record Ops: to perform operations on data records, such as selecting, merging and appending;
  - c) Field Ops: to perform operations on data fields, such as filtering, deriving new fields and determining the measurement level for given fields;
  - d) Graphs: to display data before and after modelling, and include plots, histograms, web nodes and evaluation



# Comprehensive Data Mining Workbench

- e) Modeling: to execute modelling algorithms such as neural nets, decision trees, clustering and association;
- f) Output: to produce a variety of outputs such as tables, charts and model results;
- g) Export: to produce a variety of outputs that can be used in external applications (e.g., EXCEL); and
- h) IBM SPSS Text Analytics: work with text mining nodes to incorporate the power of text analysis into your streams.

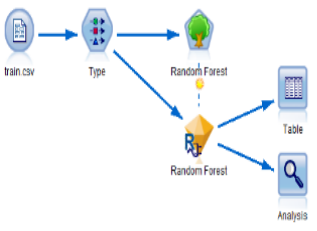


SEE MORE

### Extend SPSS with Downloads and Extensions »

SPSS Modeler

#### Model Random Forest




Classification and regression based on a forest of trees using random inputs, utilizing conditional inference trees as base learners.

R Analysis

GO TO REPO »

SPSS Modeler

#### Weather Underground Import




Accepts airport/weather station IDs and returns various weather data points for each location.

R Utility

GO TO REPO »

SPSS Modeler

#### MLlib Pagerank




Estimating the relative importance of individuals within a social network using Spark MLlib.

R Analysis

GO TO REPO »

SPSS Statistics

#### STATS BAYES REGR



This procedure calculates Bayes factors for sets of regression models and the posterior distribution. Only continuous (scale level) variables can be used.

R Analysis

GO TO REPO »

SEE MORE EXTENSIONS

# Reasons for choosing IBM SPSS Modeler

- Easy to use - very visual; no programming; Help file with numerous application examples in fraud detection, customer segmentation, credit scoring, etc.
- Comprehensive data mining workbench
- Integrates with text mining and optimisation

# Challenges in using IBM SPSS Modeler

- Need to invest and monitor usage; now it is available free under the IBM Academic Initiative
- Frequent version updates
- Need technical team to help install software for students – especially if students can install on their personal laptops and not using labs
- Avoid computer-based examinations – stress on students and faculty

Thank You.

# Career Prospects

Admission Requirement

Programme Structure

Curriculum & Schedule

Whom is this for?

Career Prospects

Financial Assistance

## What do Business Analytics Graduates work as and where can they work in?

There are typically 3 types of organisations that will employ our graduates. They are business analytics vendors and system integrators, consulting and marketing research firms and end-users of business analytics across the private and public sectors. The following are the job roles and companies that have employed our graduates:

Job Role	Company	Type of Organisations
Analytics Consultant	Sift Analytics Group (formerly known as SPSS BI Singapore)	Business Analytics Vendors & System Integrators
Associate Analytics Consultant	SAS Singapore	
Technical Analyst	NTT Data Business Solutions	
Decision Science Consultant	Aimia (formerly known as Carlson Marketing)	Consulting & Marketing Research Firm
Research Analyst	Acorn Marketing & Research	
Client Solution Executive	The Nielsen Company	

<http://www.suss.edu.sg/programmes/programme-details/Pages/BSc-Business-Analytics.aspx>

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Job Role	Company	Type of Organisations
Data Analyst	Carlson Hotels, Asia Pacific	End-users of Business Analytics - Private
Manager, Web Analytics & Content	Millenium & Copthorne	
Customer Touchpoint Measurement Specialist	OCBC Bank	
Analyst	OCBC Bank	
Analyst, Business Analytics - Consumer Banking	DBS Bank	
Data Analytics Manager	Singtel	
Sales Operations Support Analyst	Thomson-Reuters	
Marketing Analytics Analyst	Marina Bay Sands	



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Job Role	Company	Type of Organisations
Research Assistant	NUS	End-users of Business Analytics - Public
Manager, Management Information Unit	WDA	
IT Consultant	MOM	
Manager, Business Compliance	MOM	
Senior Executive, Data Miner	SMRT	
Executive, Transport Planning (Data Mining)	SMRT	
Assistant Executive, Quality Service	MND	
Data Management Executive	Ministry of Social and Family Developments	
Lecturer & Course Co-ordinator, Business Intelligence & Analytics	Temasek Polytechnic	Institute of Higher Learning

# Alumni on LinkedIn



My Groups

Discover



Search



## SUSS(UniSIM) BSBA Alumni

116 members



Manage

Member



Start a conversation with your group

Enter a conversation title...

Conversations Jobs



**Ben Lin** • Manager

Executive at Singapore University of Social Sciences

... 1mo

### TGIF!! You are warmly invited to chill out with SBIZ Alumni at Blu Jaz Café on 24 November, 7.00pm to 9.30pm!

For graduates who are keen to attend, please click the link to Alumni Portal [www.suss.edu.sg/alumniportal](http://www.suss.edu.sg/alumniportal). After logging in, please to go to E-SERVICES > Alumni Event Registration then click on the link for "Chill Out Friday with SBIZ".



#### ABOUT THIS GROUP

Being graduates of the Business Analytics program, we have very niche skills and job market so let us huddle together to learn and grow

#### MEMBERS

116 members



Invite others

#### Promoted



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Do it on a Saturday! With IME Mini MBA executive certification program!



##### Berkeley PDSA

6 -month learning journey into the

# Alumni on LinkedIn



**Hwee Theng Yeo** • 1st  
Customer Facing Data Scientist  
DataRobot • SIM University  
Singapore • 322 [Connections](#)

[Message](#) [More...](#)

## Highlights



**24 Mutual Connections**  
You and Hwee Theng both know Stefan Conrady, Rana Banerji, and 22 others



**2 Mutual Groups**  
You and Hwee Theng are both in Business Analytics, Big Data, and SUSS(University of Singapore)

## Experience



**Customer Facing Data Scientist**  
DataRobot  
Oct 2017 - Present • 4 mos



## Education



**SIM University**  
Bachelor of Science in Business Analytics, Business Analytics, 4.38  
2009 - 2012



**Singapore Polytechnic**  
Diploma, Business Administration  
2004 - 2007  
Activities and Societies: SP BP Mentoring

## Featured Skills & Endorsements

Data Mining · 12 [+](#)



Endorsed by Casper Yap and 1 other mutual connection



Endorsed by 3 of Hwee Theng's colleagues at EY

Business Intelligence... · 10 [+](#)



Endorsed by Casper Yap (mutual connection)



Endorsed by 2 of Hwee Theng's colleagues at EY

Salesforce.com · 9 [+](#)



Endorsed by Casper Yap (mutual connection)



Endorsed by 7 of Hwee Theng's colleagues at Thomson Reuters

[See 26 more skills](#) [v](#)

## Accomplishments