



SPSS[®]

for HR Analytics

Jarlath Quinn – Analytics Consultant

www.sv-europe.com

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Just waiting for all attendees to join...



SPSS[®]

for HR Analytics

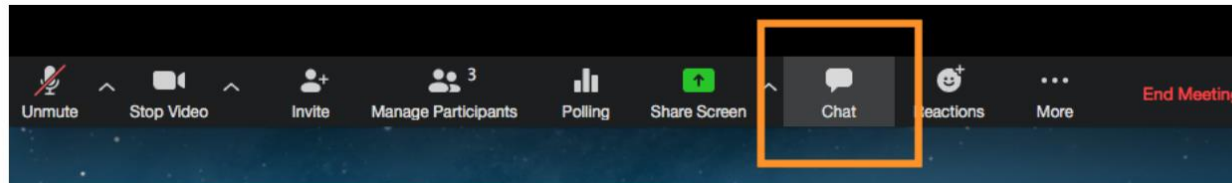
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FAQ's

- Is this session being recorded? Yes
- Can I get a copy of the slides? Yes, we'll email links to download materials after the session has ended.
- Can we arrange a re-run for colleagues? Yes, just ask us.
- How can I ask questions? All lines are muted so please use the chat panel – if we run out of time we will follow up with you.





- Gold accredited partner to IBM, Predictive Solutions and DataRobot specialising in advanced analytics & statistical technologies
- Work with open-source technologies (R, Python, Spark etc.)
- Team each has 15 to 30+ years of experience working in advanced analytics tech
- Deep experience of applied advanced analytics applications across sectors
 - Retail
 - Healthcare/Pharma
 - Finance/Insurance
 - Media/Telecoms
 - Utilities
 - FMCG
 - Charity/Housing/Government



HR Applications in Statistics and Data Science

- Machine learning models for employee churn
- Demand forecasting for hiring needs
- Data-driven salary benchmarking
- Absenteeism pattern analysis
- Employee morale trends
- Equity and fairness audits



Using statistics to assess equity and fairness

Harris Trust & Savings Bank

- A statistical study from 1979 based on an equal opportunities court case
- The judge found that there was persuasive discrimination against minorities and women in the bank's pay and promotion policies.



Los Angeles Times

Chicago Bank Settles Bias Case for Record \$14 Million

By **WILLIAM J. EATON** and **BOB SECTER**

Jan. 11, 1989 12 AM PT



TIMES STAFF WRITERS

WASHINGTON — A Chicago bank accused of job discrimination against women and minority employees has agreed to pay a record \$14 million in back wages as restitution for past bias, the Labor Department announced Tuesday.

The settlement by the Harris Trust & Savings Bank was the largest such award ever obtained by the federal government in a sex or race discrimination case and ended a 14-year legal struggle with the company.

“It is a major civil rights victory for the federal government,” Labor Department Solicitor George R. Salem said. “. . . This settlement represents a major step forward not only for the present and former employees of the Harris Bank who will benefit

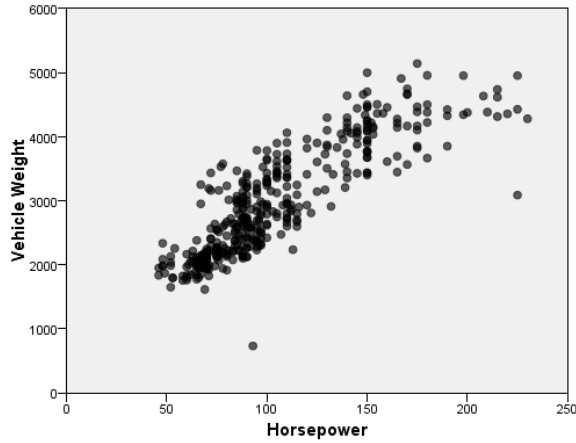


Comparing mean starting salary for men and women

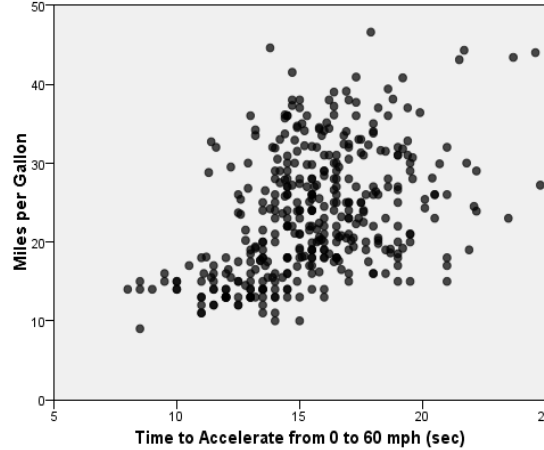


Looking for linear correlations

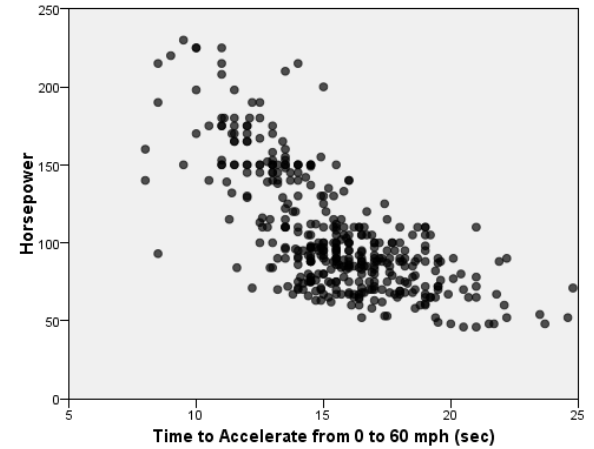
Measuring Linear Relationships



0.859



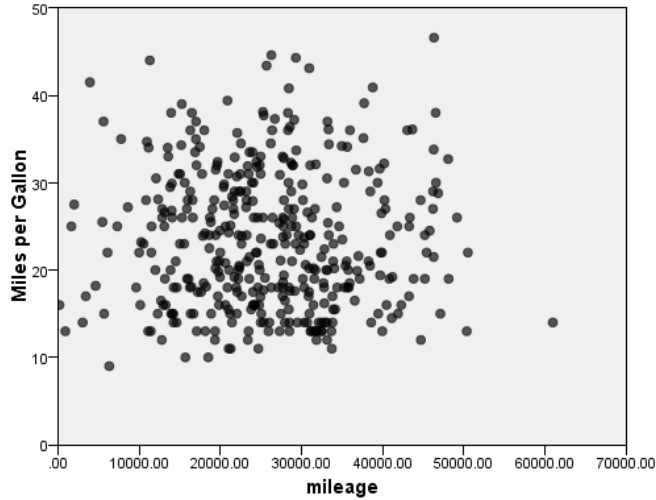
0.434



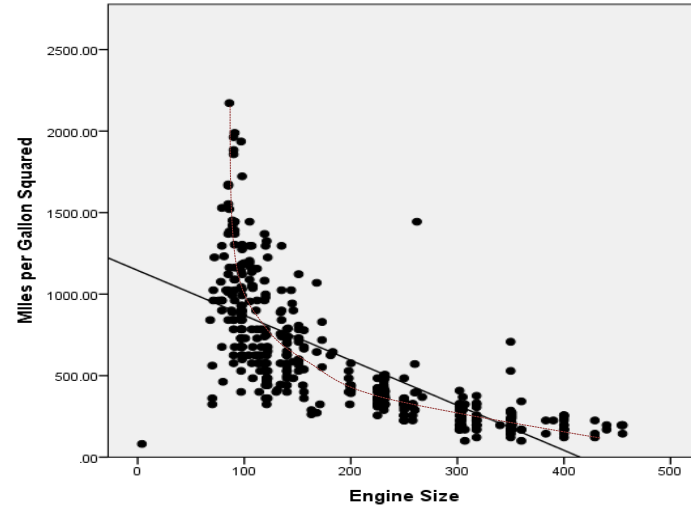
-.701

Pearson Correlation Values

Non-Linear Relationships



-0.005



-.671

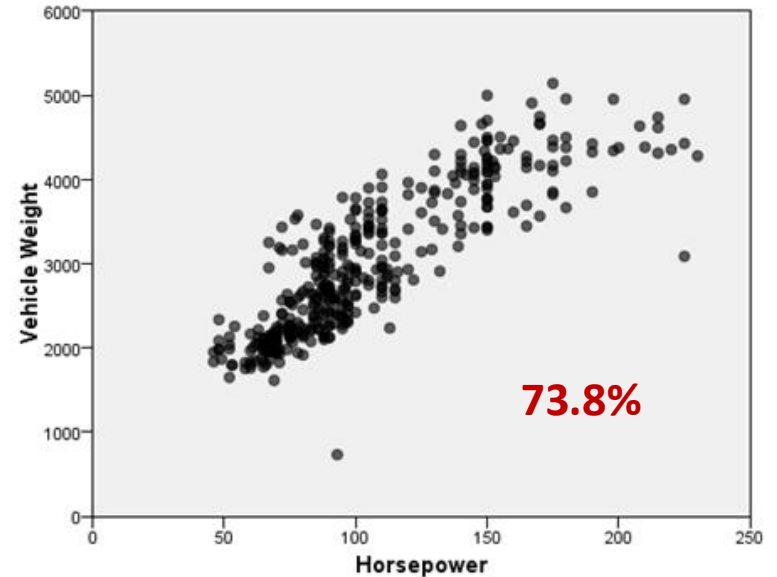
Pearson Correlation Values



Performing regression

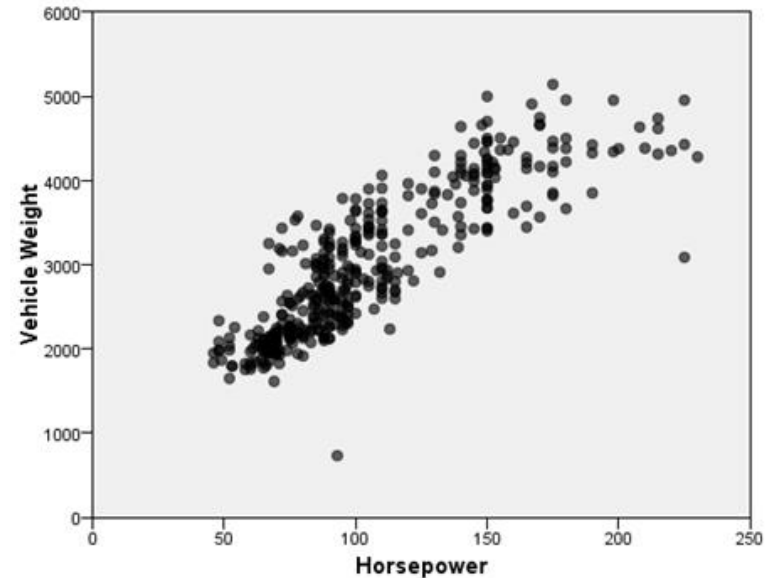
Correlations as Percentages

- Correlation = 0.859
- $0.859 \times 0.859 = 0.738$
- $0.738 = 73.8\%$
- Correlation Squared = 'R Square'



From Correlation to Prediction

How can we express linear relationships as predictive models?





How long does it take to cook a chicken?

How long does it take to cook a chicken?

- 7 minutes per pound plus 45 minutes

$$y = mx + c$$

or

- 20 minutes per pound plus 20 minutes

$$y = a + bx$$





Using decision trees to model employee retention

Why use Decision Trees?

- Decision trees can be used to
 - Build profiles of staff/customers/patients/students
 - Find key behavioural segments
 - Generate predictive models
- Decision Trees are especially popular because
 - they are visual representations of models
 - relatively easy to understand

Understanding Decision Trees

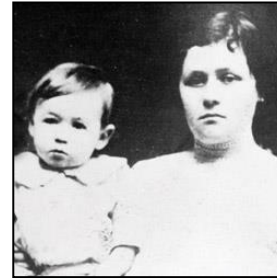
- What were the most important factors determining survival during the sinking of the RMS Titanic?

Survival on the RMS Titanic

		Count	Percent %
survive	Did not survive	1490	68%
	Survived	711	32%
	Total	2201	100%



Gender?



Age?



Class?

Statistical Tests Like Chi Square help to answer this

Survival on the RMS Titanic

		sex			
		female		male	
		Count	Column Percent %	Count	Column Percent %
survive	Did not survive	126	26.8%	1364	78.8%
	Survived	344	73.2%	367	21.2%
	Total	470	100.0%	1731	100.0%

Pearson Chi-Square Tests

		sex
survive	Chi-square	456.874
	df	1
	Sig.	.000*

Statistical Tests Like Chi Square help to answer this

Survival on the RMS Titanic

		age			
		adult		child	
		Count	Column Percent %	Count	Column Percent %
survive	Did not survive	1438	68.7%	52	47.7%
	Survived	654	31.3%	57	52.3%
	Total	2092	100.0%	109	100.0%

Pearson Chi-Square Tests

		age
survive	Chi-square	20.956
	df	1
	Sig.	.000*

Statistical Tests Like Chi Square help to answer this

Survival on the RMS Titanic

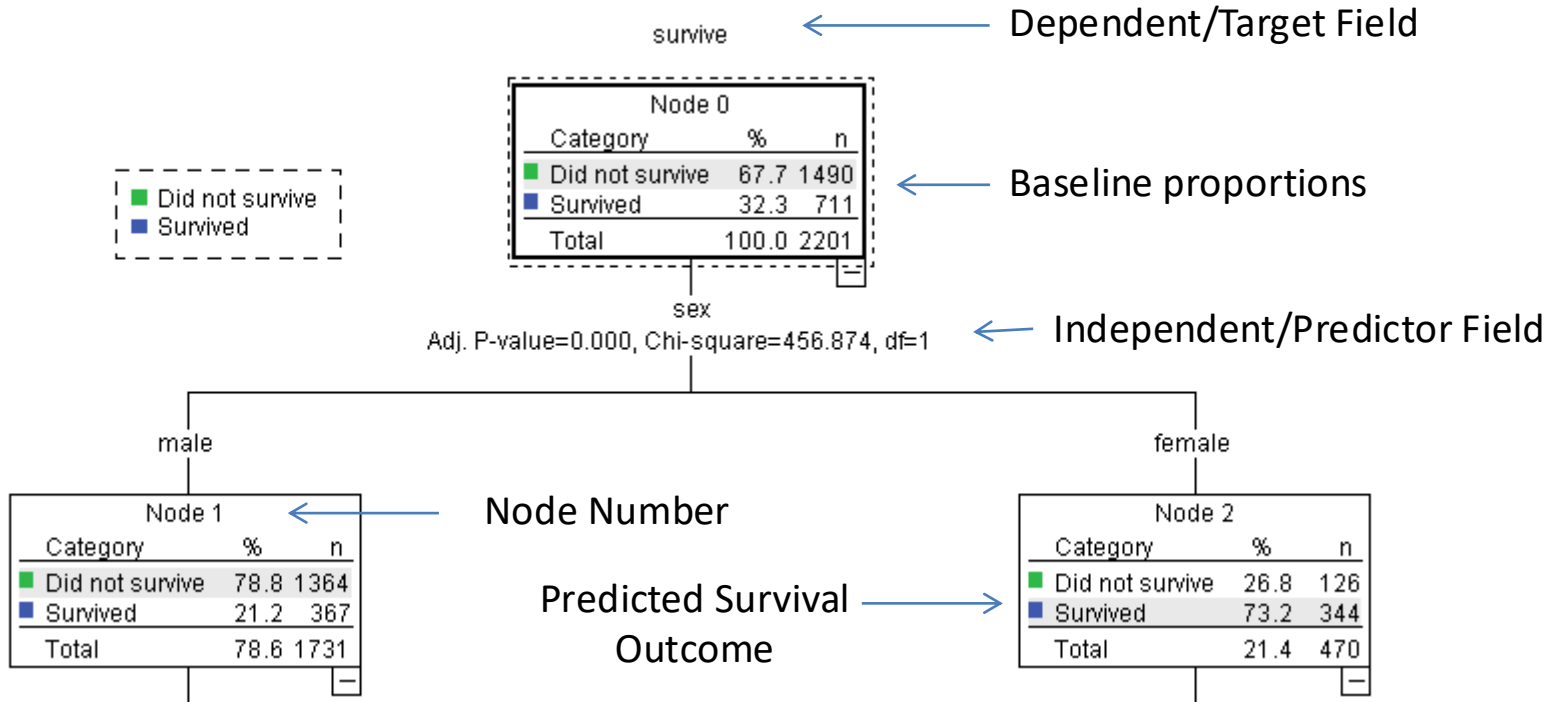
		class							
		1st		2nd		3rd		crew	
		Count	Column Percent %	Count	Column Percent %	Count	Column Percent %	Count	Column Percent %
survive	Did not survive	122	37.5%	167	58.6%	528	74.8%	673	76.0%
	Survived	203	62.5%	118	41.4%	178	25.2%	212	24.0%
	Total	325	100.0%	285	100.0%	706	100.0%	885	100.0%

Pearson Chi-Square Tests

		class
survive	Chi-square	190.401
	df	3
	Sig.	.000*

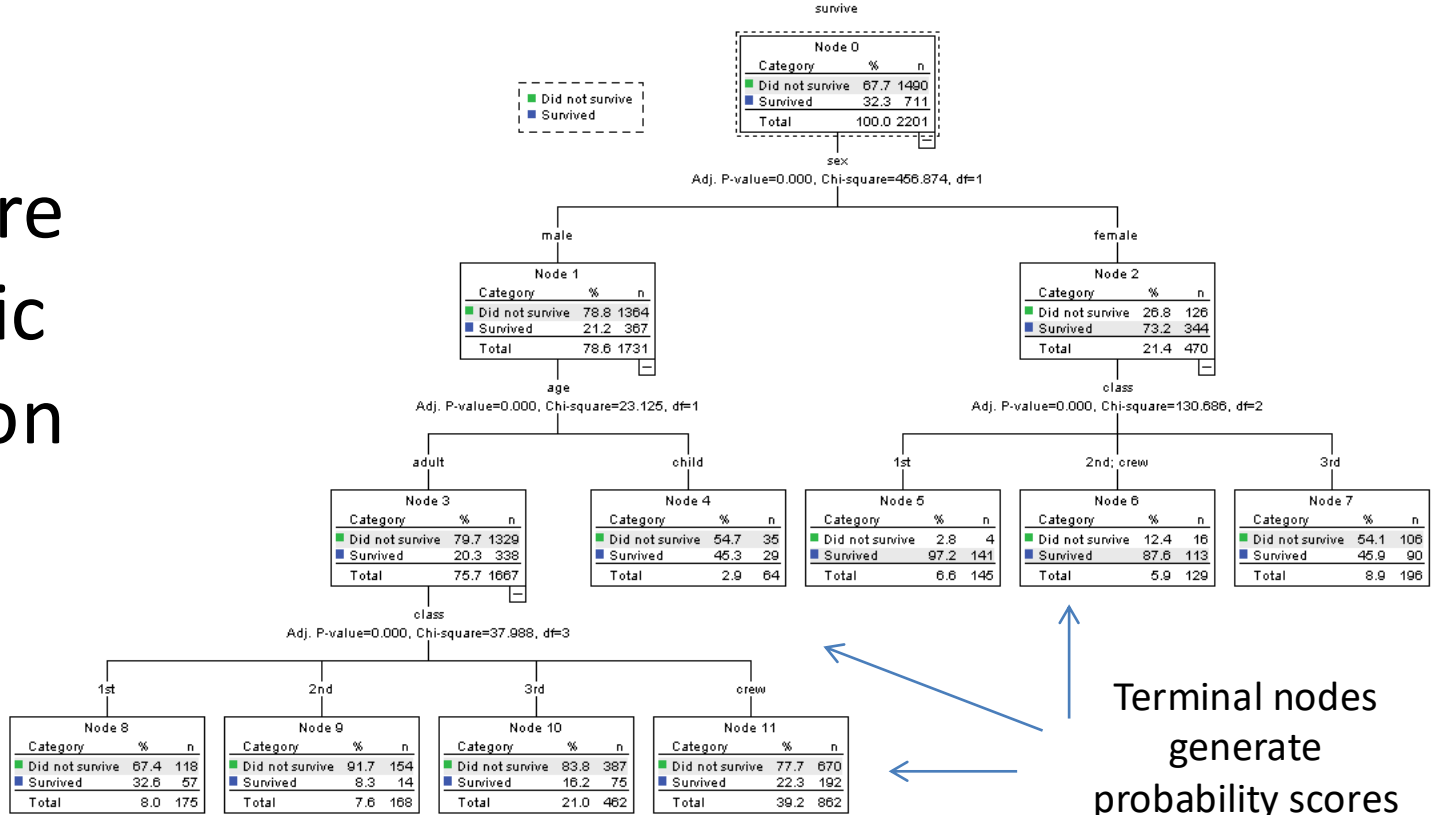
Gender is most important

...and a CHAID Decision tree will reflect this....



Full CHAID Decision Tree

C.H.A.I.D
 Chi-Square
 Automatic
 Interaction
 Detector



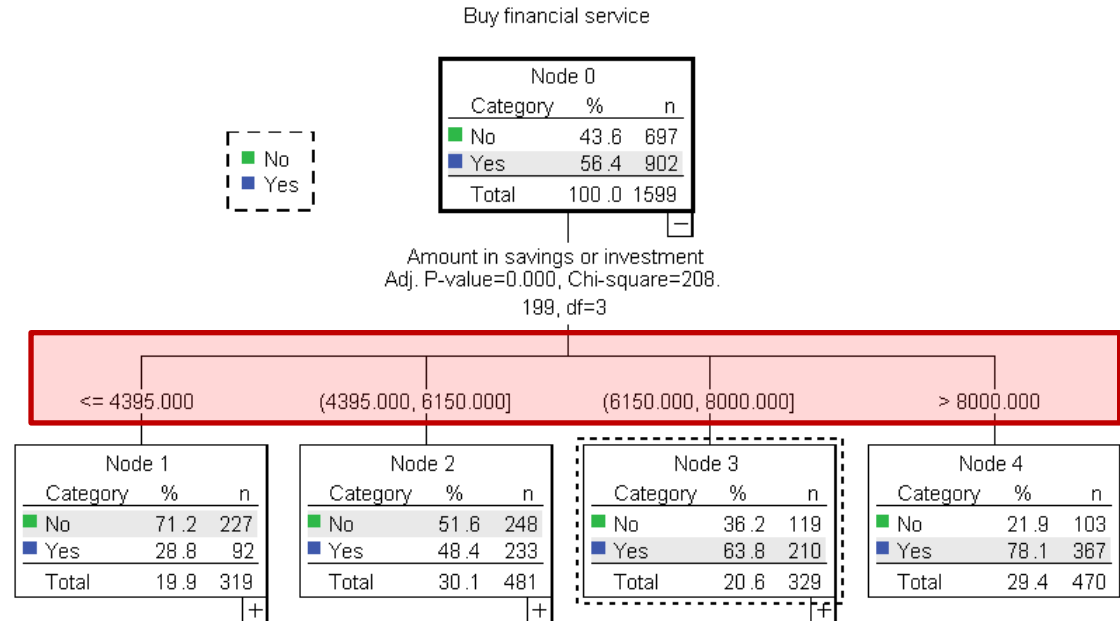
Terminal nodes
 generate
 probability scores



Merging/Splitting in CHAID Trees

Decision Trees can merge values of numeric *and* categorical predictors together

This makes the tree more efficient and easier to read





Let's take a look...



Working with Smart Vision Europe

Smart Vision provides a portfolio of online training materials **free** to existing customers or available for purchase



Factor and Cluster Analysis with IBM SPSS Statistics

£75.00
Jarlath Quinn



Introduction to Time Series Forecasting with IBM SPSS Statistics

£75.00
Jarlath Quinn



Understanding and applying logistic regression techniques in SPSS Statistics

£75.00
Jarlath Quinn



Understanding and Applying Linear Regression Techniques in SPSS Statistics

£75.00
Jarlath Quinn



Building predictive models in SPSS Modeler

£75.00
Jarlath Quinn



Statistical and significance testing in SPSS Statistics

£75.00
Jarlath Quinn



Working with decision trees in SPSS Statistics



Introduction to SPSS Modeler course



Introduction to IBM SPSS Statistics course



ChatSPSS is a free generative AI chatbot developed by Smart Vision Europe Ltd based on official IBM documentation of SPSS procedures

The screenshot shows the ChatSPSS website interface. At the top, there is a navigation bar with options: NEW CONVERSATION, EXPORT PDF, LOG OUT, PRIVACY, and SMARTVISION. The main content area is divided into two columns. The left column contains a list of conversations, with the first one selected: "How can I recode a string variable called region to create a numeric equivalent?". Below this is a section for document references, listing "IBM_SPSS_Statistics_Algorithms.pdf" and "IBM_SPSS_Statistics_Command_Syntax_Re...". The right column displays the answer to the selected question. It starts with a blue box containing the question: "How can I recode a string variable called region to create a numeric equivalent?". Below this, the answer states: "To recode a string variable called region to create a numeric equivalent, you can use the RECODE command with the INTO keyword." This is followed by a section titled "Steps to Recode the Variable" with three bullet points: "Use the RECODE command to specify the original values and the new values.", "Use the INTO keyword to specify the target numeric variable.", and "Ensure that the target variable is declared before using it." Next is a section titled "Example Syntax" showing the command: `RECODE region ('North'=1) ('South'=2) ('East'=3) ('West'=4) INTO region_num.` Below this, two bullet points explain the example: "In this example, the string variable region is recoded into the numeric variable region_num." and "The original values 'North', 'South', 'East', and 'West' are replaced with the numeric values 1, 2, 3, and 4, respectively." The final section is titled "Alternative Method" and shows a partially visible command: `Alternatively, you [input field] riable. AUTORECODE VAI [input field] /INTO region_num /PRINT.` There is a blue arrow button at the bottom right of the answer area.

Working with Smart Vision Europe

- **Sourcing Software**
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 - Assist with selection, pilot, implementation & support of analytical tools
 - <http://www.sv-europe.com/buy-spss-online/>
- **Training**
 - Formal classroom/virtual training
 - Online self-paced training resources
- **Advice and Support**
 - ‘No strings attached’ technical and business advice relating to analytics
 - Tracked technical support services around the IBM SPSS product line

Smart Vision Europe: Services and Expertise

We have decades of experience providing guidance, training and consultancy in the delivery of effective data science initiatives.



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Thank you