OpenWorld 2018

Oracle Autonomous Data Warehouse Cloud: Learn How to Build Interactive Notebooks [PRO4049]

Move the Algorithms; Not the Data!

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Agenda

1. Introduction to Autonomous Data Warehouse Cloud
2. Introduction to SQL Notebooks using Oracle Machine Learning

LIVE DEMOS: Customer Analytics

3. First Machine Learning Notebook examples
4. Using Machine Learning to target “best” customers
5. Sharing analysis with DVD and Oracle Analytics Cloud
6. Summary
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LIVE DEMOS: Customer Analytics
Autonomous Data Warehouse Cloud

• Easy
  – Fully-managed, pre-configured and optimized for DW workloads
  – Simply load data and run
    • No need to define indexes, create partitions, etc.

• Fast
  – Based on Exadata technology

• Elastic
  – Instant scaling of compute or storage with no downtime

• Includes in-Database Machine Learning
  – Library of ML algorithms implemented as fully parallelized SQL functions
ADW + Oracle Machine Learning Notebooks

Autonomous Data Warehouse

Service Management
- Service Console

Built-in Access Tools
- Oracle Machine Learning

Developer Tools
- Oracle SQL Developer

Data Integration Services
- Oracle Data Integration Platform Cloud

3rd Party DI on Oracle Cloud Compute

3rd Party DI On-premises

Oracle Object Storage Cloud
- Flat Files and Staging

Analytics
- Oracle Analytics Cloud

3rd Party Analytics on Oracle Cloud Compute

3rd Party Analytics On-premises

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# Powerful In-Database Machine Learning and Analytics

## 1. Extract value using SQL analytics
- **Hierarchical Analytics**
- **Summary & Descriptive Statistics**
- **SQL Windowing Functions**
- **Tests for Statistical Correlations**
- **Approximate Analytics**
- **Pattern Matching**
- **SQL Models**
- **Advanced Aggregations**
- **Ranking**
- **Pivoting**
- **Used-Defined PTFs**
- **Text Analytics**

## 2. Gain insight and predictions using ML
- **Classification / Prediction**
- **Regression**
- **Anomaly Detection**
- **Attribute Importance**
- **Association Rules / Market Basket Analysis**
- **Clustering**
- **Feature Extraction / Selection**
- **Time Series / Forecasting**
- **Cognitive Text Analytics**
- **Ensemble Models**
- **Predictive Queries**
- **Text Mining**

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Common Machine Learning & SQL Analytics Use Cases

• Find products and customers with highest contribution
• Target your “best” customers
• Target the right customer with the right offer
• Market basket analysis
• Predict likelihood that customer will respond to an offer
• Anticipate and prevent customer churn
• Recency, frequency, monetary (RFM) analysis
• Detect anomalous, suspicious and noncompliant behavior
• Forecast demand
Introduction to Autonomous Data Warehouse Cloud

Introduction to SQL Notebooks using Oracle Machine Learning

LIVE DEMOS: Customer Analytics

First Machine Learning Notebook examples

Using Machine Learning to target “best” customers

Sharing analysis with DVD and Oracle Analytics Cloud

Summary
What is a SQL Notebook?

• **Web-based interface** for building reports and dashboards
• Uses a series of pre-built data visualizations
• Can be *shared with other OML users*
• Can contain one or more **SQL** queries and/or SQL scripts
• Additional non-query information can be displayed using special markdown
Simple Easy **SQL Notebook Access** to ADWC Data

- **Out of the Cloud box, direct SQL access for enterprise users**
  - Easy access to shared notebooks, templates, permissions, scheduler, etc.
  - Autonomously managed by ADW

- **Collaborative UI for report builders through data scientists**
  - Simple but powerful set of data visualizations

- **Full access to in-database analytics**
  - Analytic SQL, multidimensional Analytic Views, Machine Learning etc
  - Easy to share data discoveries with other BI and DV tools
OML SQL Notebook Quick Intro Demo

3 minute demo of OML home page and key features – everything you need to know to get started
Access to OML SQL Notebook – Manage Oracle ML Users

Manage Oracle ML Users

Create new Oracle Machine Learning user accounts and manage the credentials for existing Oracle Machine Learning users.

Download Oracle Instant Client

This is a free, light-weight set of tools, libraries and SDKs for building and connecting applications. These libraries underly the Oracle APIs of languages including Node.js, Python and PHP and provide access for OCI, OCCI, JDBC, ODBC and Pro*C applications. Tools such as SQL*Plus and Oracle Data Pump are also included - Oracle recommends using this version of Data Pump for moving existing Oracle Database schemas to Autonomous Data Warehouse.
## Access to OML SQL Notebook via Web Site

### Users

<table>
<thead>
<tr>
<th>User Name</th>
<th>Role</th>
<th>Email</th>
<th>Created On</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADMIN</td>
<td>System Administrator</td>
<td><a href="mailto:nadine.schoene@oracle.com">nadine.schoene@oracle.com</a></td>
<td>8/26/18 7:30 PM</td>
<td>Open</td>
</tr>
<tr>
<td>NADINE</td>
<td>Developer</td>
<td><a href="mailto:nadin.schoene@oracle.com">nadin.schoene@oracle.com</a></td>
<td>10/21/18 3:33 PM</td>
<td>Open</td>
</tr>
</tbody>
</table>
there is no “Save” button when you are writing scripts and/or queries

=> All your work is saved automatically!
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LIVE DEMOS: Customer Analytics
Simple Oracle Machine Learning notebook example

Oracle Machine Learning example notebook for learning basic functions using SH schema data and highlights basic data selection and data viewing using the Oracle Autonomous Data Warehouse Cloud (ADWC).

By Charlie Berger


Show all tables

```
SQL>
SELECT * FROM all_tables where owner = 'SH';
```

<table>
<thead>
<tr>
<th>OWNER</th>
<th>TABLE_NAME</th>
<th>TABLESPACE_NAME</th>
<th>CLUSTER_NAME</th>
<th>IOT_NAME</th>
<th>STATUS</th>
<th>PCT_FREE</th>
<th>PCT_USED</th>
<th>INI_TRANS</th>
<th>MAX_TRANS</th>
<th>INITIAL_EXTENT</th>
<th>NEXT_EXTENT</th>
<th>MIN_EXTENTS</th>
<th>MAX_EXTENTS</th>
<th>PCT_INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH</td>
<td>SALES</td>
<td>SYSTEM</td>
<td></td>
<td></td>
<td>VALID</td>
<td>10</td>
<td>40</td>
<td>1</td>
<td>255</td>
<td>65536</td>
<td>1048576</td>
<td>1</td>
<td>2147483645</td>
<td></td>
</tr>
<tr>
<td>SH</td>
<td>TIMES</td>
<td>SYSTEM</td>
<td></td>
<td></td>
<td>VALID</td>
<td>10</td>
<td>40</td>
<td>1</td>
<td>255</td>
<td>65536</td>
<td>1048576</td>
<td>1</td>
<td>2147483645</td>
<td></td>
</tr>
<tr>
<td>SH</td>
<td>CHANNELS</td>
<td>SYSTEM</td>
<td></td>
<td></td>
<td>VALID</td>
<td>10</td>
<td>40</td>
<td>1</td>
<td>255</td>
<td>65536</td>
<td>1048576</td>
<td>1</td>
<td>2147483645</td>
<td></td>
</tr>
<tr>
<td>SH</td>
<td>PROMOTIONS</td>
<td>SYSTEM</td>
<td></td>
<td></td>
<td>VALID</td>
<td>10</td>
<td>40</td>
<td>1</td>
<td>255</td>
<td>65536</td>
<td>1048576</td>
<td>1</td>
<td>2147483645</td>
<td></td>
</tr>
<tr>
<td>SH</td>
<td>CUSTOMERS</td>
<td>SYSTEM</td>
<td></td>
<td></td>
<td>VALID</td>
<td>10</td>
<td>40</td>
<td>1</td>
<td>255</td>
<td>65536</td>
<td>1048576</td>
<td>1</td>
<td>2147483645</td>
<td></td>
</tr>
</tbody>
</table>
### Display table

```sql
-- Display SUPPLEMENTARY_DEMOGRAPHICS table
SELECT * FROM SH.SUPPLEMENTARY_DEMOGRAPHICS;
```

<table>
<thead>
<tr>
<th>CUST_ID</th>
<th>EDUCATION</th>
<th>OCCUPATION</th>
<th>HOUSEHOLD_SIZE</th>
<th>YRS_RESIDENCE</th>
<th>AFFINITY_CARD</th>
<th>BULK_PACK_DISKETTES</th>
<th>FLAT_PANEL_MONITOR</th>
<th>HOME_THEATER_PACKAGE</th>
<th>BOOKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>100031</td>
<td>&lt; Bach</td>
<td>Crafts</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>100032</td>
<td>HS-grad</td>
<td>Machine</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100033</td>
<td>HS-grad</td>
<td>Sales</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>100034</td>
<td>Bach.</td>
<td>?</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100035</td>
<td>&lt; Bach</td>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100036</td>
<td>9th</td>
<td>Crafts</td>
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<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>100037</td>
<td>HS-grad</td>
<td>Crafts</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100038</td>
<td>HS-grad</td>
<td>Farming</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
### Graph EDUCATION

```sql
-- Graph pie chart of EDUCATION (Keys), NA (Groups), CUST_ID (SUM) (Values)

SELECT * FROM SH.SUPPLEMENTARY_DEMOGRAPHICS;
```

<table>
<thead>
<tr>
<th>CUST_ID</th>
<th>EDUCATION</th>
<th>OCCUPATION</th>
<th>HOUSEHOLD_SIZE</th>
<th>YRS_RESIDENCE</th>
<th>AFFINITY_CARD</th>
<th>BULK_PACK_DISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>100211</td>
<td>&lt; Bach.</td>
<td>Protec.</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100212</td>
<td>&lt; Bach.</td>
<td>Other</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100213</td>
<td>Assoc-A</td>
<td>Cleric.</td>
<td>9+</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100214</td>
<td>HS-grad</td>
<td>Sales</td>
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<td>1</td>
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<td>0</td>
</tr>
<tr>
<td>100215</td>
<td>HS-grad</td>
<td>Transp.</td>
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<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100216</td>
<td>&lt; Bach.</td>
<td>Protec.</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>100217</td>
<td>HS-grad</td>
<td>Farming</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>100218</td>
<td>Bach.</td>
<td>Sales</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Graph EDUCATION

-- Graph pie chart of EDUCATION (Keys), NA (Groups), CUST_ID (SUM) (Values)

SELECT * FROM SH.SUPPLEMENTARY_DEMOGRAPHICS;

All fields:
CUST_ID, EDUCATION, OCCUPATION, HOUSEHOLD_SIZE, YRS_RESIDENCE, AFFINITY_CARD, BULK_PACK_DISKETTES,
FLAT_PANEL_MONITOR, HOME_THEATER_PACKAGE, BOOKKEEPINGPLICATION, PRINTER_SUPPLIES, Y_BOX_GAMES,
OS_DOC_SET_KANJI, COMMENTS

Keys
EDUCATION

Groups

Values
CUST_ID SUM
### Graph OCCUPATION vs. YRS_RESIDENCE

```sql
%sql
SELECT * FROM sh.supplemental.demographics;
```

<table>
<thead>
<tr>
<th>CUST_ID</th>
<th>EDUCATION</th>
<th>OCCUPATION</th>
<th>HOUSEHOLD_SIZE</th>
<th>YRS_RESIDENCE</th>
<th>AFFINITY_CARD</th>
<th>BULK_PACK_DISKETTES</th>
<th>FLAT_PANEL_MONITOR</th>
<th>HOME_THEATER_PACKAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>103061</td>
<td>&lt; Bach.</td>
<td>Other</td>
<td>2</td>
<td>6</td>
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<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>103962</td>
<td>HS-grad</td>
<td>Sales</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>103963</td>
<td>&lt; Bach.</td>
<td>Cleric</td>
<td>9+</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>103964</td>
<td>&lt; Bach.</td>
<td>&quot;Machine&quot;</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>103965</td>
<td>HS-grad</td>
<td>Prof.</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>103966</td>
<td>HS-grad</td>
<td>Farming</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>103967</td>
<td>Assoc-A</td>
<td>Other</td>
<td>9+</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>103968</td>
<td>HS-grad</td>
<td>Cleric</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

*Took 0 sec. Last updated by CBERGER at February 08, 2018, 4:11:18 PM.*
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LIVE DEMOS: Customer Analytics
Targeting Likely Good Credit Customers using Oracle Machine Learning’s (OML) Classification Models

Heather has spent most of her time over the past couple of years extracting and preparing data for analysis. The large volumes of data, extracting and processing mean she spends most of her time waiting for jobs to finish and very little of her time analyzing the data. Demands from marketing are forcing a new approach where the data remains in the data warehouse and is processed there. The alternative cloud solution is more complex and has no direct output of the box processes to analyze the data in place. She started looking at Oracle, and found the simple SQL commands in ADWC are familiar, and execute extremely fast, leveraging all the performance features of the platform. Further, once she is done, she can apply the learning models to incoming data on the fly, and allow end-user analysts to immediately see mining results. This drastically reduces the cycle of data preparation, analysis, and publishing. It also means there is no change to analysis/reporting Data Visualization toolset that users are familiar with.

Scroll down this notebook and learn how to use OML to create predictive perspectives on data in ADWC, WITHOUT moving it. We will process a small 100k data set, but could use a 10MM or billion row data set without worrying about processing time.

This is an extract of Alphaoffice customer information. We will first get acquainted with Apache Zeplin, the open source interface for interactive collaboration in a team environment.

The Business Problem:
Increase Sales by Targeting our Best Customers; Good Credit Customers!

Heather has a hunch that weakening sales may be due to the company selling to non-optimal customers; customers who
Credit Score Predictions Simplified...

### STEP 6: Review Data by Occupation

```sql
-- This shows an alternative presentation style - a pie chart. Note that Zeppelin visualizations are limited. In lab 400 we will use Oracle Data Visualization to create more more interesting perspectives.

select customer_id, age, income, tenure, loan_type, loan_amount, occupation, marital_status
from credit_scoring_100k_v where rownum < 1000
```

### Another Pie Chart Example

```sql
-- This shows an alternative presentation style - a pie chart. Note that Zeppelin visualizations are limited. In lab 400 we will use Oracle Data Visualization to create more more interesting perspectives.

select customer_id, age, income, tenure, loan_type, loan_amount, occupation, marital_status
from credit_scoring_100k_v where rownum < 1000
```
Credit Score Predictions Simplified ...

STEP 9: Enough with Simple Charting; Let's Run Some OML Machine Learning Algorithms!

Create Attribute Importance Machine Learning Model

```sql
-- Find the importance of attributes that independently impact the target attribute: CREDIT_SCORE_BIN

DECLARE
v_sql varchar2(100);

BEGIN
EXECUTE IMMEDIATE 'DROP TABLE ai_explain_output_credit_score_bin';
EXCEPTION WHEN OTHERS THEN NULL;
END;

BEGIN
DBMS_PREDICTIVE_ANALYTICS.EXPLAIN(
  data_table_name => 'CREDIT_SCORING_10K_V',
  explain_column_name => 'CREDIT_SCORE_BIN',
  result_Table_name => 'AI_EXPLAIN_OUTPUT_CREDIT_SCORE_BIN');
END;
```

Display the Top N Attributes for Good Credit Customers

```sql
-- Display those attributes that most influence the target field (Good Credit customers)

Select * From ai_explain_output_CREDIT_SCORE_BIN where rownum < 7;
```

**EXPLANATORY_VALUE**

![Bar chart showing attribute importance]

Took 1 sec. Last updated by CHARLIE at July 30, 2018, 3:42 AM (outdated)
STEP 11: Create Predictive Model to Target Good Credit Customers

Now that Heather has found the key attributes that most influence finding more Good Credit customers and also making better Maximum Credit Card Amount decisions, she wants to leverage Oracle Machine Learning’s powerful in-Database, parallelized algorithms to build predictive models that help her company to better target “the right customers” with the “right offers”.

Let’s quickly review the machine learning process:

**Problem Definition:** Target Good Credit Customers

**Data Gathering and Preparation:** We’ve assembled 100K records with 100+ variable about each customer and have created a target field (Good Customer/Other Customer) so we can use OML’s Supervised Algorithms, specifically let’s start by using a decision tree algorithm.

**Model Building and Evaluation:** We’ll create a randomly selected sample from our Credit_Scoring_100k historical data and use 60% as training data for the machine learning model building phase. Then, we’ll use the remaining 40% as a holdout sample to test our model’s accuracy using various model evaluation tools such as a “lift chart”.

**Knowledge Deployment:** Once we’re satisfied that we have a useful ML model that can predict with some accuracy which customers we should target (Good Credit customers), we want to apply our OML model to new customer data inside ADWC and then take a deeper look at them. Lastly, we’ll jump over to Oracle Analytics Cloud for a more interactive, exploratory data analysis experience but now focusing on our customers of interest (Good Credit customers).
**STEP 17: Review the CREDIT_SCORING_NEW_PREDICTIONS Table and rank Good Customers Based on Prediction Probability, and Other Factors**

<table>
<thead>
<tr>
<th>CUSTOMER_ID</th>
<th>PROB_GOOD_CREDIT</th>
<th>AGE</th>
<th>INCOME</th>
<th>TENURE</th>
<th>LOAN_TYPE</th>
<th>LOAN_AMOUNT</th>
<th>OCCUPATION</th>
<th>EDUCATION_LEVEL</th>
<th>MARITAL_STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>41,434</td>
<td>98.94</td>
<td>54</td>
<td>4,250</td>
<td>9</td>
<td>Need</td>
<td>30,000</td>
<td>Manager</td>
<td>Bachelor's Degree</td>
<td>Married</td>
</tr>
<tr>
<td>49,459</td>
<td>98.94</td>
<td>27</td>
<td>5,250</td>
<td>18</td>
<td>Auto</td>
<td>40,000</td>
<td>Manager</td>
<td>Bachelor's Degree</td>
<td>Married</td>
</tr>
<tr>
<td>54,025</td>
<td>98.94</td>
<td>40</td>
<td>4,000</td>
<td>9</td>
<td>Auto</td>
<td>50,000</td>
<td>Manager</td>
<td>Bachelor's Degree</td>
<td>Married</td>
</tr>
</tbody>
</table>

Taken 1 sec. Last updated by CHARLIE at August 03 2018, 4:54:24 PM. (outdated)

**STEP 18: Apply a ML Model to a Single Record in a Transactional Application**

```sql
-- Try this out by running query and then change customer_value_segment from 'Gold' to 'Silver' to see lower probability of customer having Good Credit

select prediction_probability(ML_CLASS_MODEL, 'Good Credit'
    USING 'Very Rich' as WEALTH, 2000 as income, 'Silver' as customer_value_segment, 'Owner' as residential_status) Prediction_Probability
from dual;
```

**PREDICTION_PROBABILITY**

0.98945
Agenda

1. Introduction to Autonomous Data Warehouse Cloud
2. Introduction to SQL Notebooks using Oracle Machine Learning

LIVE DEMOS: Customer Analytics

3. Identifying Customer Segments using Clustering
4. Using Machine Learning to find anomalous customers
5. Sharing analysis with DVD and Oracle Analytics Cloud
6. Summary
Targeting High Credit Customers - Project

Attribution_Name
CONSUMER_FINDEX_SCORE, WEALTH,

Importance_Value, Rank by Attribution_Name

<table>
<thead>
<tr>
<th>Attribution_Name</th>
<th>Importance_Value</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSUMER_FINDEX_SCORE</td>
<td>0.74</td>
<td>1</td>
</tr>
<tr>
<td>CUSTOMER_DMG_SEGMENT</td>
<td>0.54</td>
<td>3</td>
</tr>
<tr>
<td>CUSTOMER_LIFETIME_VALUE</td>
<td>0.08</td>
<td>13</td>
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<tr>
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Importance_Value by Attribution_Name

- CONSUMER_FINDEX_SCORE
- WEALTH
- CUSTOMER_DMG_SEGMENT
- HIGHEST_CREDIT_CARD_LIMIT
- INCOME
- MAX_CC_SPENT_AMOUNT
- OCCUPATION
- DELINQUENCY_STATUS
- EDUCATION_LEVEL
- FAMILY_SIZE
- NUMBER_OF_LIABLES
- NEW_BANKRUPTCY
- NUMBER_OF_COLLECTIONS

Key Factors of Good Credit Customers
Agenda

1. Introduction to Autonomous Data Warehouse Cloud
2. Introduction to SQL Notebooks using Oracle Machine Learning
3. Identifying Customer Segments using Clustering
4. DEMO: Using Machine Learning to find anomalous customers
5. DEMO: Sharing analysis with DVD and Oracle Analytics Cloud
6. Summary

Code Examples: Customer Analytics
• Traditional — “Move the data”

ORACLE® — “Move the algorithms”

Simpler, smarter data management
+ Analytics / Machine Learning architecture
Oracle Machine Learning SQL Notebook in ADWC

• Easy
  – Web based SQL notebook integrated into ADW
  – Autonomous setup and configuration
  – Sample gallery of notebooks for machine learning

• Flexible
  – Full SQL access to 18c in-database analytics

• Collaborative
  – Collaboration and sharing built-in
  – Easy sharing with other BI, data visualization tools
Try ADW and OML Today – Totally Free!

Get Started with Oracle Cloud Platform for Free

Up to 3,500 free hours

Build production-ready workloads by using a variety of cloud services including Database, Compute, Blockchain, IoT, Big Data, API Management, Integration, Chatbots, and many more

Examples of What You Can Do With Oracle Cloud Platform

- Compute, Storage and Networking
- Modernize with Oracle Cloud
- Develop in Java, Node.js
- Oracle MySQL, NoSQL
Where to get more information...
Related OOW Sessions

• **Key Hands-on Labs**
  – Oracle Machine Learning Hands-on Lab at Oracle Code One
  – Oracle Autonomous Data Warehouse Cloud: From Zero to Data Insight in Minutes Hands-on Lab
  –

• **Key Sessions**
  – Oracle Autonomous Data Warehouse Cloud: Data Warehousing for Everybody
  – Oracle Autonomous Data Warehouse Cloud: A Step-by-Step Guide
  – Oracle Autonomous Data Warehouse Cloud: What Every DBA Should Know
Where to get more information

- **Product information:** [cloud.oracle.com/datawarehouse](cloud.oracle.com/datawarehouse)
- **Documentation**
- **Hands-on Workshops**
  - [https://oracle.github.io/learning-library/workshops/journey4-adwc](https://oracle.github.io/learning-library/workshops/journey4-adwc)
Where to get more information

• New **Q&A Forum** on Cloud Customer Connect
  – [https://cloudcustomerconnect.oracle.com/resources/32a53f8587/summary](https://cloudcustomerconnect.oracle.com/resources/32a53f8587/summary)

• **Forbes**: Autonomous Capabilities Will Make DBAs More Valuable
Analytics and Data Summit
All Analytics. All Data. No Nonsense.
March 12 – 14, 2019

Formerly called the BIWA Summit with the Spatial and Graph Summit
Same great technical content...new name!
www.AnalyticsandDataSummit.org