Using Microsoft Dynamics CRM for Analytical CRM:
A Curriculum Package for Business Intelligence or Data Mining Courses

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Abstract: The purpose of this curriculum package attempts to show how to use the Microsoft SQL Server Business Intelligence Development Studio to access Microsoft Dynamics CRM and conduct a data mining and analysis. First, students use the Dynamics CRM 2013 to input sales data (lead and opportunity). Second, students use SQL Server Business Intelligence Development Studio to analyze the data to find out the relationship between lead and opportunity. The mining models used in the assignment are: decision tree, clustering, Naïve Bayes, and logistic regression. Finally, students can decide which mining mode is good and what customers have the highest possibility to transfer from lead phase to opportunity phase.

INTRODUCTION

Business intelligence and analytical CRM are popular topics in the MIS curriculum today. The purpose of this curriculum package attempts to show how to use the Microsoft SQL Server Business Intelligence Development Studio to access Microsoft Dynamics CRM and conduct a data mining and analysis. First, students use the Dynamics CRM 2013 to input sales data (lead and opportunity). Second, students use SQL Server Business Intelligence Development Studio to analyze the data to find out the relationship between lead and opportunity. The mining models used in the assignment are: decision tree, clustering, Naïve Bayes, and logistic regression. Finally, students can decide which mining mode is good and what customers have the highest possibility to transfer from lead phase to opportunity phase.

The assignment requires Microsoft Dynamics CRM 2013 but it can be transferred to Dynamics CRM 2015 with a minimum modification. The Dynamics CRM portion can be done online or on premise. The SQL Server portion can be done online or on premise but it is best done in a local area network environment for security consideration.
ORGANIZATION OF THIS CURRICULUM PACKAGE

This curriculum package is showed in the following sequences:

I. Outline of for the class
II. Reading Materials before the class, and
III. Materials during the class.

I. Outline (Agenda) for the Class

A. Lecture (15 – 20 minutes)
   1. Introduction to business intelligence & Analytical CRM
   2. Major CRM and BI systems
   3. Why do we choose Microsoft Dynamics CRM for business intelligence courses?
   4. Built-in BI features in Microsoft Dynamics CRM
   5. Link Microsoft Dynamics CRM and SQL Server Business Intelligence Development Studio
   6. The Dashboard in Microsoft Dynamics CRM
   7. Analytical CRM and mobile devices

B. Step-by-step Hands-on Exercises (40 – 45 minutes)
   1. Create Leads and Opportunities using Microsoft Dynamics CRM systems (15 minutes)
   2. Use in Microsoft SQL Server Development Studio to access Microsoft Dynamics CRM (25 minutes)
   3. Discussion for the results (5 minutes)
II. Reading Materials before the Class

A. Required Reading

1. Students are required to read the following book about business intelligence (Chapter 6), and customer relationship management (Chapter 8).


   http://highered.mcgraw-hill.com/sites/0073376825/information_center_view0/

2. Read the first chapter of the following book and understand the features of Microsoft Dynamics CRM:

B. Optional Reading

You can browse the Internet to look the following books, video clips, or articles but it is not required:

B1. Books

1. Marc J. Wolenik, Microsoft Dynamics CRM 2013 Unleashed,

2. Damian Sinay, Microsoft Dynamics CRM 2011 Reporting and Business Intelligence

3. Alok Singh and Sandeep Chanda, Microsoft Dynamics CRM 2013 Marketing Automation
B.2 Video

1. Dynamics CRM in YouTube.  
   [https://www.youtube.com/user/msdyncomm/DynamicsCRM](https://www.youtube.com/user/msdyncomm/DynamicsCRM)

2. CRM Business Intelligence - Demonstrating Microsoft Dynamics Charts & Dashboards  
   [https://www.youtube.com/watch?v=Vip8KCQRVe8](https://www.youtube.com/watch?v=Vip8KCQRVe8)

3. Lori Harner et al., Microsoft Dynamics Webcast: Business Intelligence for Microsoft Dynamics CRM  
   (download is required)

B.3 Others (online)

1. Create custom reports using Business Intelligence Development Studio  

2. The Indispensable Guide to Chart Design and Data Visualization – Part 1  

### III. Materials Used during the Class

A. PowerPoint Slides

B. Step-by-Step Hands-on Exercises

B.1 How to access Microsoft Dynamics CRM 2013 (5 minutes)

B.1.1 The Objective of the Assignment

1. How to access Microsoft Dynamics CRM 2013.
2. Know the website, user id, and password to access Microsoft Dynamics CRM 2013 Online.
3. You can also contact DYNAA for set up a one-semester account. Please contact dynaa@microsoft.com

B.1.2 Access Microsoft Dynamics CRM2013

1. Make sure that the computer has an active Internet connection and ensure that you use Internet Explorer to access Microsoft Dynamics CRM.
2. In the Internet Explorer, go to [http://crm.clecloud.com](http://crm.clecloud.com)
3. If you do not see the following screen but a denial message, click the refresh button on Internet Explore. If you see the following screen, login into Dynamics CRM using the user id and password provided by the professor:
4. It may take 2-3 minutes if you use it for the first time.
5. You should see the following screen:

Click the [X] as shown in the above picture to skip the "Frist things first" and you will see the following screen.
The menu structure is organized as the following picture:

Answer the following questions:

1) List four sub menu items in Marketing (the third item in main menu)

2) List at least 3 sub menu items in Sales
B.2 Sales Modules (15 minutes)

B.2.1 The Objective of the Assignment

1. Understand sales features of Microsoft Dynamics CRM online
2. Understand Sales Process Management
3. Explain the concept of the sales processes in Microsoft Dynamics CRM

B.2.2 Step-by-step Exercises

A sales representative wants to know his potential customers and see whether they can be converted to real customers. The potential customers expressed their interest before and have been recorded in CRM systems as leads. The sales representative (You will act as the sales representative in the exercise) will use Dynamics CRM 2013 to do it.

What is the meaning of the Leads under Sales?

1. Click in the main menu, then click Sales -> click Leads. You will see “My Open Leads” but you may not see any leads.

Change “My Open Leads” to “All Leads” then you will see all the leads.
Change “All Leads” to “Open Leads” and “Close Leads”. What is the difference between open leads and close leads?

2. Leads are potential customers for your company. In the list of leads, one of them is Debra Garcia. After review her profile and contact her (See the following picture), you believe that she can be converted to Opportunity.
Move the screen down and you can see a map. Click the map and you will expand the map.

Close the Bing map.

Return to previous screen and close the profile for Debra.

3. Create a new lead: click New as follows:
Enter the following information:

**Topic:** Interested in buying the product
**Name:** Kara Mchen+1xx (xx is your number)
**Company:** Clcloud+1xx (xx is your number)

Click **Save**.

Now check My Open Lead, see whether you can see it
4. Put a check mark on Kara Mchen1xx and click Qualify.

The Michen1xx’s name is disappeared because she is moved to the list of the opportunity.

**Opportunity**

Go to Opportunity (Sales -> Opportunities on the menu) as follows:

You will see the following screen:
What is the rating for Kara Mchen1XX?

Click Kara Mchen1XX. You will see the following similar screen:

Click Close as Won. You will see the following screen:
Put $250 in the Actual Revenue and click OK. You may see something similar to the following:

Provide a screenshot to prove that you have done this portion of the assignment.
B3. Use Business Intelligence Development Studio to Access CRM Database (20 minutes)

B.3.1 The Objective of the Assignment

The purpose of this assignment is to show how to use Business Intelligence Development Studio to access CRM database in SQL Server. We try to find out what type of customers has the higher possibility to transfer from leads to opportunities than other types of customers.

B.3.2 Step-by-Step Assignments

B.3.2.1 Creating an Analysis Services Project for Microsoft Dynamics CRM Database

“A Microsoft SQL Server Analysis Services (SSAS) project defines the schema for the objects in a single Analysis Services database. The Analysis Services database is defined by the mining models, OLAP cubes, and supplemental objects that it contains. Students in this exercises operates the server in a local area network environment or using remote desktop to access the server.”* (Microsoft MSDN)

3.2.1.1 To create an Analysis Services project for CRM Database

1. Start-> All Programs -> Microsoft SQL Server 2008 -> SQL Server Business Intelligence Development Studio.
2. The following screen appear:

3. On the File menu, point to New, and then select Project as follows:

4. Verify that Analysis Services Project is selected in the Templates pane.

5. In the Name box, name the new project “CRM Report Project 2” or any other names assigned by the instructor (See below).
3.2.1.2 Creating a Data Source

“A data source is a data connection that is saved and managed within your project and deployed to your Microsoft SQL Server 2008 Analysis Services (SSAS) database. The data source contains the server name and database where your source data resides, in addition to any other required connection properties.”* (Microsoft MSDN)

To create a data source

1. In Solution Explorer, right-click the Data Sources folder and select New Data Source.

The Data Source Wizard opens.
2. On the Welcome to the Data Source Wizard page, click Next.

3. Click New to add a connection to the Adventure Works database.

4. In the Provider list in Connection Manager, select Native OLE DB|SQL Server Native Client 10.0.

5. In the Server name text box, type localhost.

6. Verify that Use Windows Authentication is selected. In the Select or enter a database name list, select EMU_USM_Clcloud_MSCRM as the database name.
7. Click Test Connection to test the connection to the database.
8. Click OK, and then click Next.
9. On the Impersonation Information page of the wizard, select Use the service account, and then click Next.
10. On the Completing the Wizard page, type the name EMU_USM_Clcloud_MSCRM (or the name assignment by your instructor) and then click Finish to create the new data source.

The new data source, EMU_USM_Clcloud_MSCRM.ds, appears in the Data Sources folder in Solution Explorer.

3.2.1.3 Creating a Data Source View

“A data source view provides an abstraction of the data source. This lets you modify the structure of the data to make it more relevant to your project. By using data source views, you can select the tables that relate to your particular project, establish relationships between tables, and add calculated columns and named views without modifying the original data source.”* (Microsoft MSDN)

To create a data source view

1. In Solution Explorer, right-click Data Source Views, and select New Data Source View.

The Data Source View Wizard opens as follows.
2. On the **Welcome to the Data Source View Wizard** page, click **Next**.

3. On the **Select a Data Source** page, by default the EMU_USM_Clcloud_MSCRM data source that you created in the last task is selected under **Relational data sources**. Click **Next**.

4. On the **Select Tables and Views** page, select the following tables, and then click the right arrow to include them in the new data source view:

   - `AccountBase (dbo)`
   - `AccountLeads (dbo)`
   - `DiscountBase (dbo)`
   - `LeadBase(dbo)`
   - `OpportunityBase(dbo)`
3.2.1.4 Mining Model: Building a Targeted Customers for Mail or E-mail

Objective

“The marketing department wants to increase sales by targeting specific customers for a mailing or e-mail campaign. By investigating the attributes of known customers, the company hopes to discover patterns that they can then transfer potential customers from lead to opportunity. They hope to use the discovered patterns to predict which potential customers are most likely to transfer from lead to opportunity or purchase from the company.”* (Microsoft MSDN).

The Microsoft Dynamics CRM's database, contains a list of customers (lead) and a list of highly potential customers (opportunity). In this assignment you will create a targeted mailing or e-mail scenario. After you complete the tasks in this assignment, you will have the following:

- A set of mining models that will suggest the most likely customers from a list of potential customers.
- A clustering of current customers.

To complete the tasks in this assignment, you will use

a) the Microsoft Naive Bayes Algorithm,

b) the Microsoft Logistic Regression Algorithm,

c) the Microsoft Decision Trees Algorithm, and

d) the Microsoft Clustering Algorithm.

5. Click Next.

6. On the Completing the Wizard page, by default the data source view is named EMU_USM_Cloud_CRM. Click Finish.

Data Source View Designer opens to display the EMU_USM_Cloud_CRM data source view.
Step-by-Step

The first step in creating a targeted mailing scenario is to use the Data Mining Wizard in Business Intelligence Development Studio to create a new mining structure and decision tree mining model.

To create a mining structure for a targeted mailing scenario

1. In Solution Explorer, right-click Mining Structures and select New Mining Structure. The Data Mining Wizard opens as follows:

   ![Data Mining Wizard](image)

   Use this wizard to create a new mining structure and a new mining model. A mining structure is a data structure that represents discovered knowledge based on analysis of OLAP or relational data. A mining model can be used to make predictions, if supported by the data mining technique used to create the mining model.

   Click Next to build a mining structure and a mining model, or Cancel to exit the wizard.

2. On the Welcome to the Data Mining Wizard page, click Next.
3. On the Select the Definition Method page, verify that From existing relational database or data warehouse is selected, and then click Next.
4. On the Create the Data Mining Structure page, under Which data mining technique do you want to use?, select Microsoft Decision Trees.
In this tutorial you will create several models based on this initial mining structure. The first model will be created together with the structure when you complete the wizard, and will be based on the Microsoft Decision Trees algorithm.

5. Click Next.

6. On the Select Data Source View page, notice that EMU_USM_Cloud_CRM is selected by default. Click Browse to view the tables in the data source view, and then click Close to return to the wizard.

7. Click Next.
8. On the **Specify Table Types** page, select the check box in the **Case** column next to the Opportunity_Base table, and then click **Next**.

![Data Mining Wizard](image)

9. On the **Specify the Training Data** page, verify that the check box in the **Key** column is selected next to the **Name** column.
   
   If the source table from the data source view indicates a key, the Data Mining Wizard automatically chooses that column as a key for the model.

10. Select **Input** and **Predictable** next to the **CustomerNeed** column.

![Data Mining Wizard](image)
When you indicate that a column is predictable, the **Suggest** button is enabled. Clicking **Suggest** opens the **Suggest Related Columns** dialog box, which lists the columns that are most closely related to the predictable column.

11. On the **Specify Columns' Content and Data Type** page, click **Detect**.

   An algorithm runs that samples numeric data and determines whether the numeric columns contain continuous or discrete values. After clicking **Detect**, make sure that the entries in the **Content Type** and **Data Type** columns have the settings listed in the following table.

12. Click **Next**.

![Data Mining Wizard](image)

14. On the Completing the Wizard page, in Mining structure name, type Opportunity_CRM.
15. In Mining model name, type Opportunity_CRM_Decision_Tree.
16. Select the Allow drill through check box.
17. Click Finish.

### 3.2.1.5 Modifying the Targeted Mailing Model

The initial mining structure that you created in the previous task contains a single mining model that is based on the Microsoft Decision Trees algorithm. In this task, you will define three additional models by using the **Mining Models** tab of Data Mining Designer. In this task you will define a Naive Bayes model, a Clustering model, and a logi Regression model.

1. Switch to the **Mining Models** tab as follows in Data Mining Designer in Business Intelligence Development Studio.
Notice that the designer displays two columns, one for the mining structure and one for the initial mining model, which you created in the previous task in this lesson.

2. Right-click the **Structure** column and select **New Mining Model**.

The **New Mining Model** dialog box opens.

3. In **Model name**, type **Opportunity_CRM_Clustering**.
4. In **Algorithm name**, select **Microsoft Clustering**.
5. Click **OK**.

A new model appears in the **Mining Models** tab of Data Mining Designer. A model that is built with the Microsoft Clustering algorithm can cluster and predict continuous and discrete attributes. Although you can modify the column
usage and properties for the new model, no changes are required for the Opportunity_CRM_Clustering model for this tutorial.

To create a Naive Bayes model

1. In the **Mining Models** tab of Data Mining Designer, right-click the **Structure** column, and select **New Mining Model**.
   
   The **New Mining Model** dialog box opens.

2. In **Model name**, type Opportunity_CRM_NaiveBayes.

3. In **Algorithm name**, select Microsoft Naive Bayes. Click **OK**.
   
   A message appears explaining that the Microsoft Naive Bayes algorithm does not support the Age, Geography Key, and Yearly Income columns, which are continuous. To work with these columns in the Naive Bayes model, you must discretize them. For this tutorial you will just ignore the columns.

4. Click **Yes** to acknowledge the message and continue.

A new model appears in the **Mining Models** tab. Although you can modify the column usage and properties for all the models in this tab, no changes are required for the Opportunity_CRM_ model for this tutorial.

To create a logistics Regression model

1. In the **Mining Models** tab of Data Mining Designer, right-click the **Structure** column, and select **New Mining Model**.
   
   The **New Mining Model** dialog box opens.

2. In **Model name**, type Opportunity_CRM_Regression.

3. In **Algorithm name**, select Microsoft Logistic Regression. Click **OK**.

4. Click **Yes** to acknowledge the message and continue.

A new model appears in the **Mining Models** tab. Although you can modify the column usage and properties for all the models in this tab, no changes are required for the Opportunity_CRM_Regression model for this tutorial.

**Processing the Mining Models**

Now that the structure and parameters for the mining models are complete, you can deploy and process the models. Processing Data Mining Objects

To deploy the project and process the mining models

1. **Press F5**.
   
   The Analysis Services database is deployed to the server computer, and the mining models are processed.

You will see the following diagrams:

1) Go to mining model view and choose Opportunity_CRN_Regression as the mining model.
2) Go to mining model view and choose Opportunity_CRN_Cluster as the mining model.

3) Go to mining model view and choose Opportunity_CRN_NavieBayes as the mining model:
CONCLUSIONS AND FUTURE RESEARCH

While the results are not perfect, it shows how students can use BIDS to analyze the CRM data. Future research will focus on how to improve this curriculum package.
REFERENCES

_____. Microsoft Dynamics CRM Handouts (2011), distributed in 2012 Preconference of the Microsoft Dynamics Academic Alliance, Houston, TX, March 2012.


*Note: The assignment for the SQL Server Business Intelligence Development Studio is modified from previous SQL Server sample assignment in MSDN library.*