Assignment #2 (Group Assignment)

Solve a prediction problem using an unsupervised learning method. Work in groups of 4-5. Have ONE person from your group submit the following: problem statement, approach, summary of findings/recommendation, data, visualizations, model/code, output. Make sure to include the group name and names of all group members. You can source the data from here (the link will open in new window):

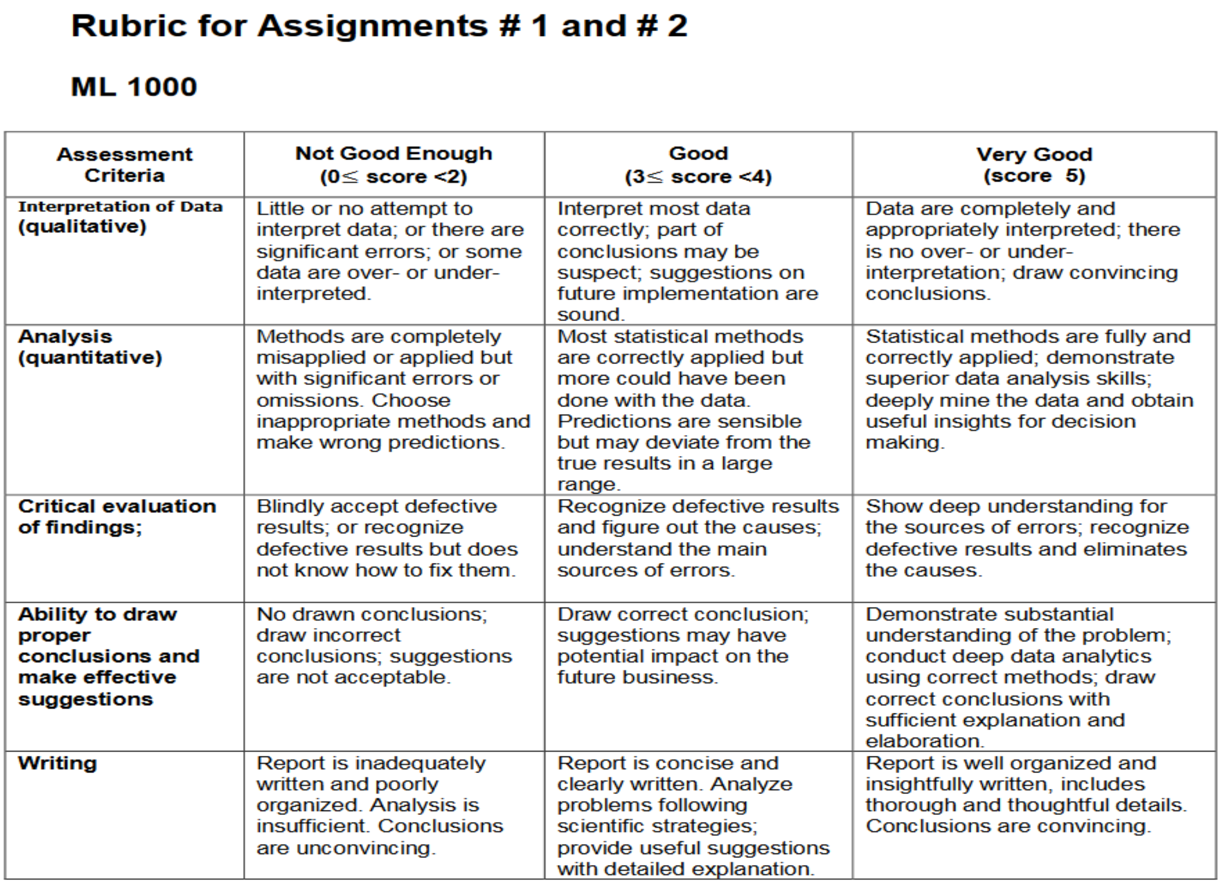
https://blog.bigml.com/list-of-public-data-sources-fit-for-machine-learning

You are expected to submit at the due date. **Sunday, 3 November 2019, 11:55 PM**

1) R Markdown
2) Deployed Shiny app link
3) Shiny app code + data used

For the labs, I recommend you use a dataset that contains between **10-50 attributes and 1000+ rows** which contains **missing values, outliers and both categorical and numeric attributes**

Assignment Rubric: https://learn.continue.yorku.ca/pluginfile.php/282419/mod_page/content/4/Rubric%20for%20Assignments.pdf



Rubric for Assignments # 1 and # 2

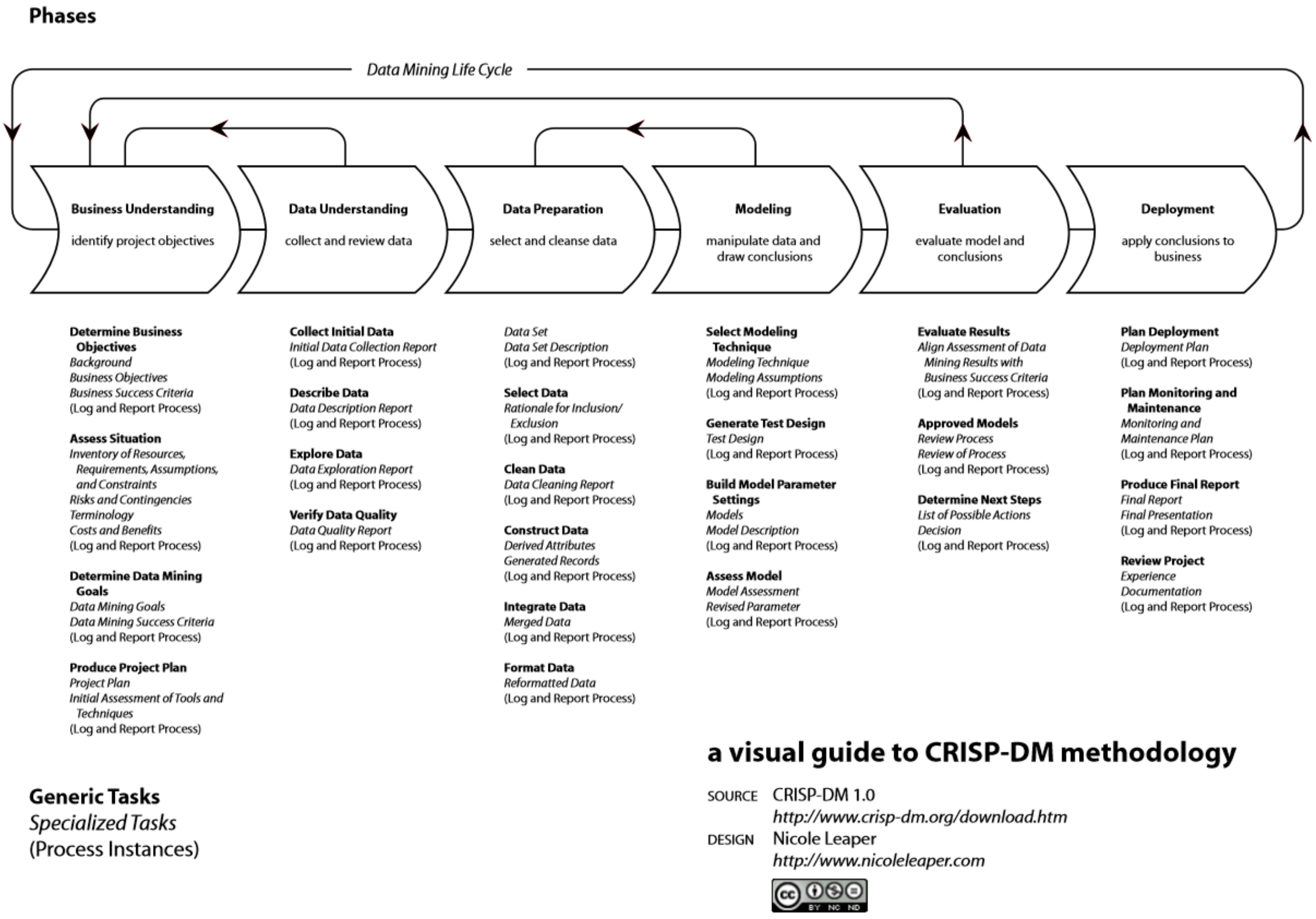
ML 1000

Assessment Criteria	Not Good Enough (0≤ score <2)	Good (3≤ score <4)	Very Good (score 5)
Interpretation of Data (qualitative)	Little or no attempt to interpret data; or there are significant errors; or some data are over- or under-interpreted.	Interpret most data correctly; part of conclusions may be suspect; suggestions on future implementation are sound.	Data are completely and appropriately interpreted; there is no over- or under-interpretation; draw convincing conclusions.
Analysis (quantitative)	Methods are completely misapplied or applied but with significant errors or omissions. Choose inappropriate methods and make wrong predictions.	Most statistical methods are correctly applied but more could have been done with the data. Predictions are sensible but may deviate from the true results in a large range.	Statistical methods are fully and correctly applied; demonstrate superior data analysis skills; deeply mine the data and obtain useful insights for decision making.
Critical evaluation of findings;	Blindly accept defective results; or recognize defective results but does not know how to fix them.	Recognize defective results and figure out the causes; understand the main sources of errors.	Show deep understanding for the sources of errors; recognize defective results and eliminates the causes.
Ability to draw proper conclusions and make effective suggestions	No drawn conclusions; draw incorrect conclusions; suggestions are not acceptable.	Draw correct conclusion; suggestions may have potential impact on the future business.	Demonstrate substantial understanding of the problem; conduct deep data analytics using correct methods; draw correct conclusions with sufficient explanation and elaboration.
Writing	Report is inadequately written and poorly organized. Analysis is insufficient. Conclusions are unconvincing.	Report is concise and clearly written. Analyze problems following scientific strategies; provide useful suggestions with detailed explanation.	Report is well organized and insightfully written, includes thorough and thoughtful details. Conclusions are convincing.

By the end of this class, you will be able to:

1. Describe different data mining tasks and the algorithms most appropriate for addressing them in order to solve business problems.
2. Demonstrate competency in the use of CRISP-DM (the Cross-Industry Standard Process for Data Mining) in all phases of a machine learning project (e.g. business understanding phase, the data understanding phase, the exploratory data analysis phase, the modeling phase, the evaluation phase, and the deployment phase).
3. Conceptualize a data mining solution in R to a practical problem.
4. Demonstrate how to do basic visualization in R.
5. Explain the concept of data pre-processing.
6. Describe the basic cognitive biases that might affect the project design and the Ethical ML framework for a machine learning project.
7. Explain the mathematical and statistical foundations of the proper clustering of data.
8. Describe different data mining tasks and the algorithms most appropriate for addressing them specifically as it relates to clustering problems.
9. Evaluate basic clustering algorithms with respect to their accuracy including PCA.
10. Develop hypotheses based on the analysis of the results obtained through applying the ML techniques and test them to determine whether the models are useful and usable.

CRoss Industry Standardized Procedure for Data Mining:



Phases

Data Mining Life Cycle

Business Understanding
identify project objectives

Data Understanding
collect and review data

Data Preparation
select and cleanse data

Modeling
manipulate data and draw conclusions

Evaluation
evaluate model and conclusions

Deployment
apply conclusions to business

Determine Business Objectives
Background
Business Objectives
Business Success Criteria
(Log and Report Process)

Assess Situation
Inventory of Resources, Requirements, Assumptions, and Constraints
Risks and Contingencies
Terminology
Costs and Benefits
(Log and Report Process)

Determine Data Mining Goals
Data Mining Goals
Data Mining Success Criteria
(Log and Report Process)

Produce Project Plan
Project Plan
Initial Assessment of Tools and Techniques
(Log and Report Process)

Collect Initial Data
Initial Data Collection Report
(Log and Report Process)

Describe Data
Data Description Report
(Log and Report Process)

Explore Data
Data Exploration Report
(Log and Report Process)

Verify Data Quality
Data Quality Report
(Log and Report Process)

Data Set
Data Set Description
(Log and Report Process)

Select Data
Rationale for Inclusion/ Exclusion
(Log and Report Process)

Clean Data
Data Cleaning Report
(Log and Report Process)

Construct Data
Derived Attributes
Generated Records
(Log and Report Process)

Integrate Data
Merged Data
(Log and Report Process)

Format Data
Reformatted Data
(Log and Report Process)

Select Modeling Technique
Modeling Technique
Modeling Assumptions
(Log and Report Process)

Generate Test Design
Test Design
(Log and Report Process)

Build Model Parameter Settings
Models
Model Description
(Log and Report Process)

Assess Model
Model Assessment
Revised Parameter
(Log and Report Process)

Evaluate Results
Align Assessment of Data Mining Results with Business Success Criteria
(Log and Report Process)

Approved Models
Review Process
Review of Process
(Log and Report Process)

Determine Next Steps
List of Possible Actions
Decision
(Log and Report Process)

Plan Deployment
Deployment Plan
(Log and Report Process)

Plan Monitoring and Maintenance
Monitoring and Maintenance Plan
(Log and Report Process)

Produce Final Report
Final Report
Final Presentation
(Log and Report Process)

Review Project
Experience
Documentation
(Log and Report Process)

Generic Tasks
Specialized Tasks
(Process Instances)

a visual guide to CRISP-DM methodology

SOURCE CRISP-DM 1.0
http://www.crisp-dm.org/download.htm
DESIGN Nicole Leaper
http://www.nicoleleaper.com