CSYE 7270

Building Virtual Environments

Analytics

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Analytics

Counts towards assignment score

### Game Machine Learning/Analytics

### (100 Points) Develop Machine Learning/Analytics for your Game

Develop Machine Learning/Analytics for your Game. Implement your analytics in a game.

You can build a Machine Learning/Analytics model from scratch or tweak an existing model. If you tweak an existing model you must provide the source of the base model, and reference it.

Possible Machine Learning/Analytics techniques include:

1. Fundamental principles of learning algorithms: regression and logistic regression, decision trees, ensemble classifiers, generative/likelihood methods
2. Local methods: clustering and collaborative filtering
3. Bayesian Learning, Naive Bayes
4. Ensemble methods: Bagging, boosting
5. Text Classification, Bag of words representation, Sentiment Analysis
6. Neural networks
7. Time Series Prediction and Forecasting
8. Time Series Similarity
9. Anomaly detection
10. Subgraph Pattern Mining
11. Graph Search
12. Link analysis and random walks
13. Social Network Analysis
14. Etc.

**Scoring Rubric**

100 points possible

|  |  |
| --- | --- |
| **Requirement** | **Points** |
| Analytics Model | 40 |
| Implementation in a game. | 40 |
| Tests | 10 |
| Quality | 10 |

**Submission**

You will submit your assignment via BlackBoard.

Click the title of assignment (blackboard -> assignment -> <Title of Assignment>), to go to the submission page.

### Game Machine Learning/Analytics Resources.

*All free online*

Textbooks are all available for free to NEU students via SpringerLink ([http://link.Springer.com/](http://link.springer.com/)). You must access SpringerLink from an NEU IP address to have full access and/or download these books.

An Introduction to Statistical Learning with Applications in R (2013)

Authors: Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani

Free online via SpringerLink ([http://link.Springer.com/](http://link.springer.com/)) <http://link.springer.com/book/10.1007/978-1-4614-7138-7>

ggplot2: Elegant Graphics for Data Analysis (2009)

Authors: Hadley Wickham

Free online via (http://link.springer.com/)

<http://link.springer.com/book/10.1007/978-0-387-98141-3>

R Quick Syntax Reference

Authors: Margot Tollefson

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-1-4302-6641-9>

Probability for Statistics and Machine Learning Fundamentals and Advanced Topics (2011)

Authors: Anirban DasGupta Springer Texts in Statistics

Free online via SpringerLink ([http://link.Springer.com/](http://link.springer.com/) <http://link.springer.com/book/10.1007/978-1-4419-9634-3>

The Elements of Statistical Learning: Data Mining, Inference, and Prediction (2011)

Authors: Trevor Hastie, Robert Tibshirani and Jerome Friedman

Free online <http://web.stanford.edu/~hastie/local.ftp/Springer/OLD/ESLII_print4.pdf>

Beginning Data Science with R

Authors: Manas A. Pathak

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-3-319-12066-9>

Recommended Texts

Data Mining with Rattle and R The Art of Excavating Data for Knowledge Discovery (2011)

Authors: Graham Williams

Free online via SpringerLink ([http://link.Springer.com/](http://link.springer.com/)) <http://link.springer.com/book/10.1007/978-1-4419-9890-3>

Machine Learning with R Cookbook

Authors: Yu-Wei, Chiu (David Chu)

PDF: <http://lib.psylab.info/files/Chiu2015.pdf>

Bayesian Essentials with R

Authors: Jean-Michel Marin, Christian P. Robert

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-1-4614-8687-9>

Text Analysis with R for Students of Literature

Authors: Matthew L. Jockers

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-3-319-03164-4>

R Machine Learning Essentials

Authors: Michele Usuelli

PDF: <http://lib.psylab.info/files/Usuelli2014.pdf>

Introductory Time Series with R

Authors: Andrew V. Metcalfe, Paul S.P. Cowpertwait

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-0-387-88698-5>

R Graphs Cookbook Second Edition

Authors: Jaynal Abedin and Hrishi V. Mittal

PDF: <http://lib.psylab.info/files/Mittal2015.pdf>

R Graph Essentials

Authors: David Alexander Lillis

PDF: <http://lib.psylab.info/files/Lillis2014.pdf>

Mastering Predictive Analytics with R

Authors: Rui Miguel Forte

PDF: <http://lib.psylab.info/files/Forte2015.pdf>

Data Analytics - Models and Algorithms for Intelligent Data Analysis 2012

Authors: Thomas A. Runkler

ISBN: 978-3-8348-2588-9 (Print) 978-3-8348-2589-6 (Online)

<http://link.springer.com/book/10.1007/978-3-8348-2589-6>

Computational Social Network Analysis: Trends, Tools and Research Advances 2010

Editors: Ajith Abraham, Aboul-Ella Hassanien, Vaclav Sná¿el

ISBN: 978-1-84882-228-3 (Print) 978-1-84882-229-0 (Online)

<http://link.springer.com/book/10.1007/978-1-84882-229-0>

Biostatistics with R

Authors: Babak Shahbaba

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-1-4614-1302-8>

Introduction to Probability Simulation and Gibbs Sampling with R

Authors: Eric A. Suess, Bruce E. Trumbo

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-0-387-68765-0>

A Modern Approach to Regression with R

Authors: Simon Sheather

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-0-387-09608-7>

R by Example

Authors: Jim Albert, Maria Rizzo

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-1-4614-1365-3>

Graphical Models with R

Authors: Søren Højsgaard, David Edwards, Steffen Lauritzen

Free online via SpringerLink (<http://link.Springer.com/)>

http://link.springer.com/book/10.1007/978-1-4614-2299-0

Data Manipulation with R

Authors: Statistical Computing Facility Phil Spector

Free online via SpringerLink (<http://link.Springer.com/)>

http://link.springer.com/book/10.1007/978-0-387-74731-6

A Tiny Handbook of R

Authors: Mike Allerhand

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-3-642-17980-8>

Bayesian Networks in R

Authors: Radhakrishnan Nagarajan, Marco Scutari, Sophie Lèbre

Free online via SpringerLink (<http://link.Springer.com/)>

http://link.springer.com/book/10.1007/978-1-4614-6446-4

Introducing Monte Carlo Methods with R

Authors: Christian Robert, George Casella

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-1-4419-1576-4>

Two-Way Analysis of Variance

Statistical Tests and Graphics Using R

Authors: Christian Robert, George Casella

Free online via SpringerLink (<http://link.Springer.com/)>

http://link.springer.com/book/10.1007/978-1-4614-2134-4

Applied Spatial Data Analysis with R

Authors: Roger S. Bivand, Edzer Pebesma, Virgilio Gómez-Rubio

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-1-4614-7618-4>

Nonlinear Regression with R

Authors: Christian Ritz, Jens Carl Streibig

Free online via SpringerLink (<http://link.Springer.com/)>

http://link.springer.com/book/10.1007/978-0-387-09616-2

Statistical Analysis with R

Authors: OLEG NENADIC´ , WALTER ZUCCHINI

PDF: <http://www.statoek.wiso.uni-goettingen.de/mitarbeiter/ogi/pub/r_workshop.pdf>

R Statistical Application Development by Example Beginner's Guide

Authors: Robert J Knell

PDF: [http://www.introductoryr.co.uk/Introductory%20R%20example%20chapters.pdf](http://www.introductoryr.co.uk/Introductory%2520R%2520example%2520chapters.pdf)

An Introduction to R for Quantitative Economics

Authors: Vikram Dayal

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-81-322-2340-5>

The Environment in Economics and Development

Authors: Vikram Dayal

Free online via SpringerLink (<http://link.Springer.com/)>

<http://link.springer.com/book/10.1007/978-81-322-1671-1>

References and Links:

* <https://unity3d.com/machine-learning>
* <https://unity3d.com/how-to/unity-machine-learning-agents>
* <https://docs.unity3d.com/Manual/UnityAnalytics.html>
* <https://unity3d.college/2017/04/09/unity-analytics/>
* <https://hub.packtpub.com/getting-started-with-ml-agents-in-unity-tutorial/>
* <https://github.com/Unity-Technologies/ml-agents>
* <https://www.youtube.com/watch?v=jVIXAOhZd1E>
* <https://docs.unity3d.com/Manual/UnityAnalyticsSetup.html>