

Thesis Outline

Nick Zinck

Jan 2018

Contents

1	Introduction	3
1.1	Problem Statement	3
1.2	Objective	3
1.3	Scope of Work	3
2	Background	3
2.1	Applications for Watershed Data Science	3
2.2	Application Development Frameworks	3
2.3	Department of Conservation and Recreation Watershed Department . .	4
2.3.1	Quabbin and Wachusett Reservoir	4
2.3.2	Water Quality Sampling Plan	4
2.3.3	Previous Watershed Studies	4
3	Application Development Overview (Method)	4
3.1	R and RStudio	4
3.1.1	Shiny	4
3.1.2	Tidyverse	4
3.2	Database	4
3.3	Github	4
3.4	Development Strategy/Goals/Practice	4
3.5	Application Packaging and Deployment	4
4	Application Features and Findings (Results)	6
4.1	Data Query and Export	6
4.2	Temporal Analysis	6
4.2.1	Scatter Plot	6

4.2.2	Statistics	6
4.3	Correlation	6
4.3.1	Scatter Plot	6
4.3.2	Pearson Correlation Matrix	6
4.4	Distribution	6
4.5	Profile Data	6
4.5.1	Interpolated Color Profile Plot	6
4.5.2	Profile Line Plot	6
4.5.3	Profile Statistics	6
4.6	Phytoplankton	6
4.7	Geospatial Plotting	6
4.8	MetaData	6
4.9	Data Import	6
5	Discussion and Reccomendations	6
5.1	Pros and Cons of Application	6
5.2	Future Work	7
5.2.1	Meteorological and Hydrological Data	7
5.2.2	Forestry	7
5.2.3	Reports	7
6	Appendix	7
6.1	WAVE Developer Manual	7
6.2	WIT Developer Manual	7
7	References	7

1 Introduction

1.1 Problem Statement

1.2 Objective

1.3 Scope of Work

2 Background

2.1 Applications for Watershed Data Science

2.2 Application Development Frameworks

R - Shiny

Python - Pyramid, Django, Flask)

Other (Ruby on Rails, node.js)

2.3 Department of Conservation and Recreation Watershed Department

2.3.1 Quabbin and Wachusett Reservoir

2.3.2 Water Quality Sampling Plan

2.3.3 Previous Watershed Studies

3 Application Developement Overview (Method)

3.1 R and RStudio

3.1.1 Shiny

3.1.2 Tidyverse

3.2 Database

3.3 Github

3.4 Developement Strategy/Goals/Practice

Modules and Functions Naming Conventions

3.5 Application Packaging and Deployment

Desktop Shortcut, portable R, portable chrome

4 Application Features and Findings (Results)

4.1 Data Query and Export

4.2 Temporal Analysis

4.2.1 Scatter Plot

4.2.2 Statistics

4.3 Correlation

4.3.1 Scatter Plot

4.3.2 Pearson Correlation Matrix

4.4 Distribution

4.5 Profile Data

4.5.1 Interpolated Color Profile Plot

4.5.2 Profile Line Plot

4.5.3 Profile Statistics

4.6 Phytoplankton

4.7 Geospatial Plotting

4.8 MetaData

4.9 Data Import

5 Discussion and Recommendations

5.1 Pros and Cons of Application

Upkeep

5.2 Future Work

5.2.1 Meteorological and Hydrological Data

5.2.2 Forestry

5.2.3 Reports

6 Appendix

6.1 WAVE Developer Manual

6.2 WIT Developer Manual

7 References