

Forecasting of Staffing Needs

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Agenda

- Introduction
- The Data
- Data Science Approaches
- Timeline

Introduction

The Partner - Providence Health Care

- Providence Health Care (PHC) is a non-profit organization.
- Almost 9,000 people working at their 16 facilities - 6,000 staff, 1,000 medical staff/physicians, 200 researchers, 1,600 volunteers.
- PHC is the provincial centre for the care of six groups of people with often-intensive health needs:
 - heart and/or lung diseases;
 - kidney disease;
 - mental illnesses;
 - Older British Columbians (residential care, seniors, & geriatrics);
 - HIV/AIDS; and
 - urban health issues (homelessness, drug & alcohol-related issues & malnutrition).

Objective

The purpose of this project is to forecasting staffing needs in healthcare on a weekly basis, providing insight on how many back up staff PHC needs to have a full staff.

Final Product

The final product will consist of:

- a dashboard (developed in R Shiny or Tableau);
- the scripts containing the code used to proceed with the analysis; and
- a report outlining the methodologies and findings.

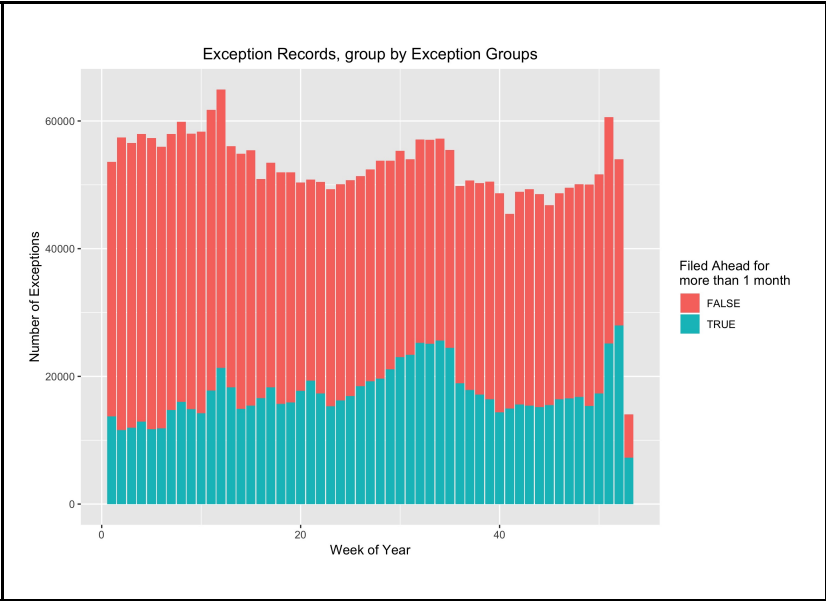
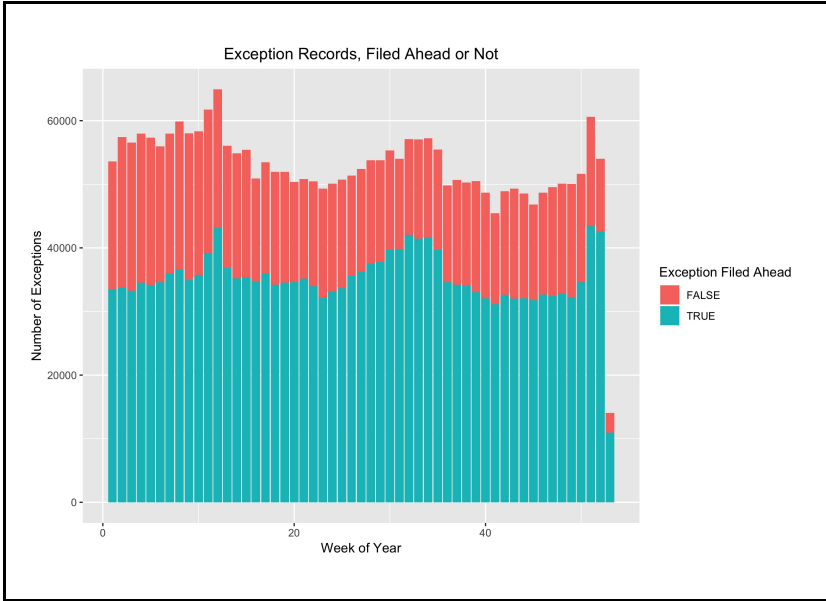
The Data

Data Description

EXCEPTION_CREATION_DATE	EXCEPTION_GROUP	JOB_FAMILY_DESCRIPTION	JOB_TITLE	PROGRAM	SUB_PROGRAM	SHIFT_DATE	EARNING_CATEGORY
2017-10-25	Leave of Absence	Registered Nurse-DC1	RN Vacation Relief	HEART LUNG	BARBARA HALL	2018-01-01	Relief Not Needed
2018-01-01	Casual Sick or Cancelled	Licensed Practical Nurse	Licensed Practical Nurse	MEDICINE	MSJ NURSING UNITS	2018-01-01	Relief Not Needed
2017-11-15	Swap	Registered Nurse-DC1	Registered Nurse	HEART LUNG	MELANIE MULDER	2018-01-01	PT Over FTE
2017-11-30	Vacancy	Care Aide (Resident)	Resident Rehab Care Attendant	SENIORS CARE	RES SVCS LAN	2018-01-01	Regular Relief Utilized
2016-10-04	Vacancy	Clerical Other	Clerk IV	SURGERY	OR PAR SPH	2018-01-01	PT Over FTE

Data Wrangling

- Raw data is based on exception record: one entry per record
- To apply linear regression: make each row a day, summarise the related variables
- Feature selection needed



Feature Selection

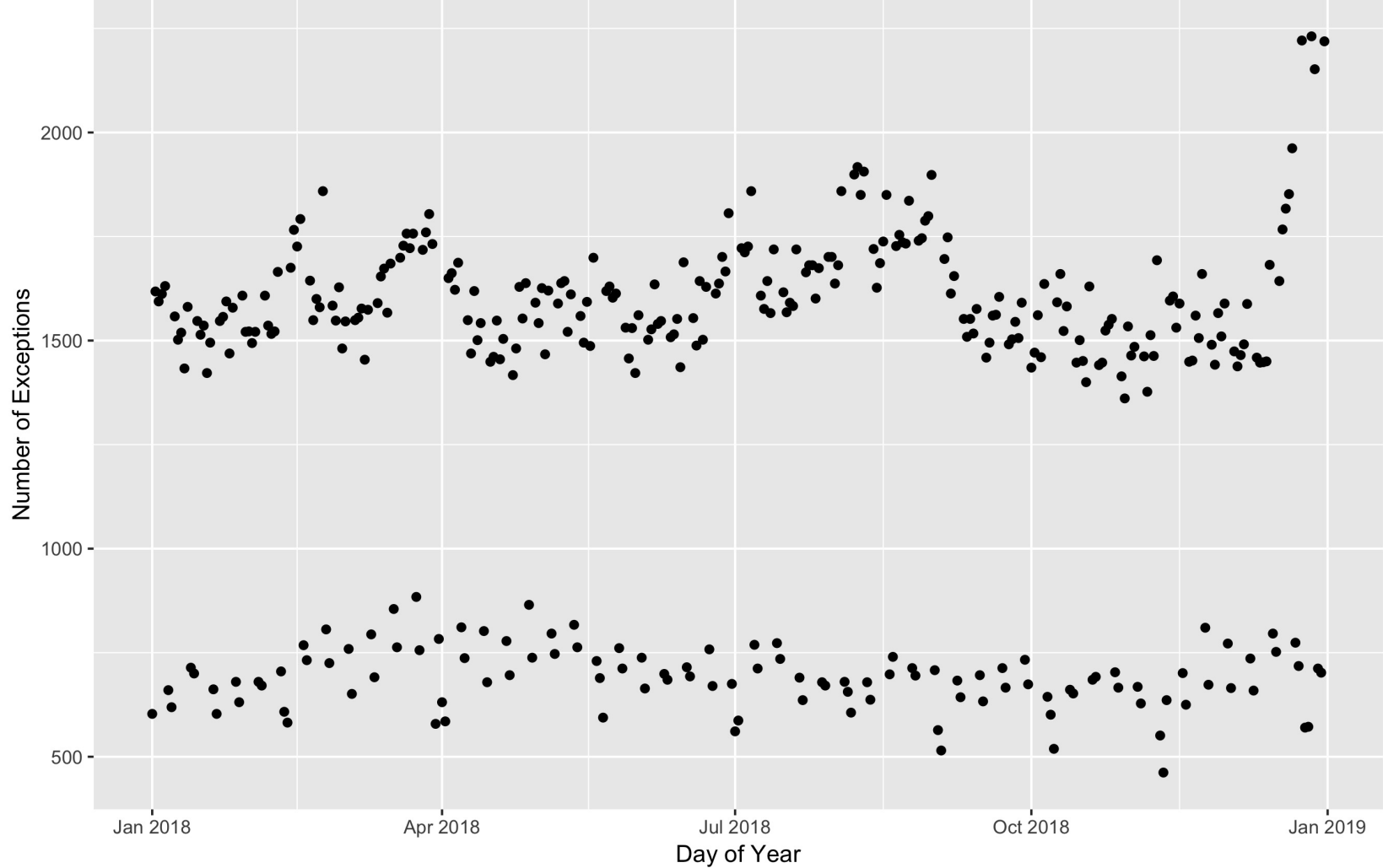
- Select correlated variables among 33 columns and other wrangled variables
- Some potential related variables:
 - Numbers/Hours of exceptions that are filed ahead
 - Exception Group
 - Job Family
 - Program

Data Science Approaches

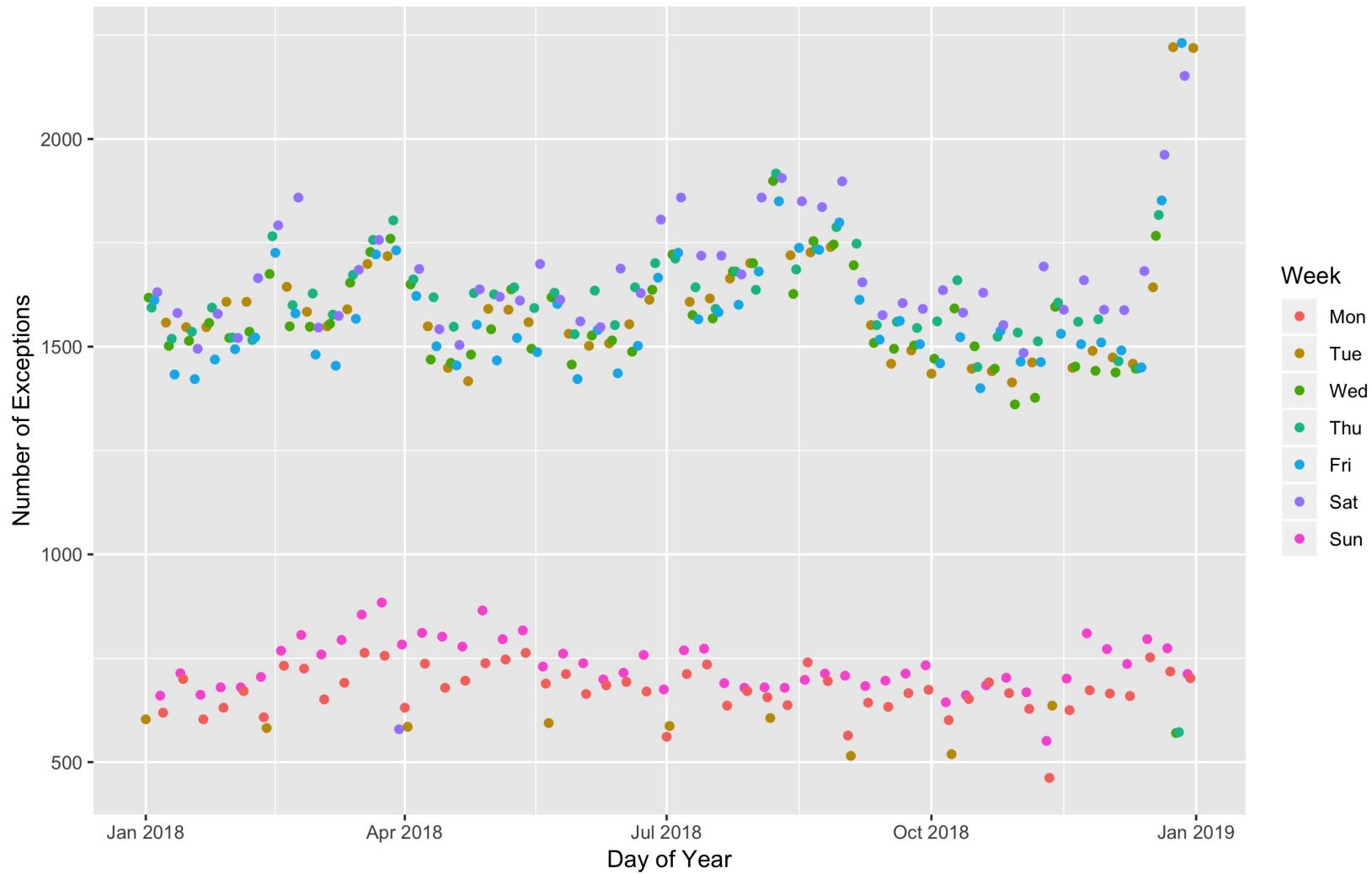
- Time Series
- Linear Regression
- Neural Network

Time Series

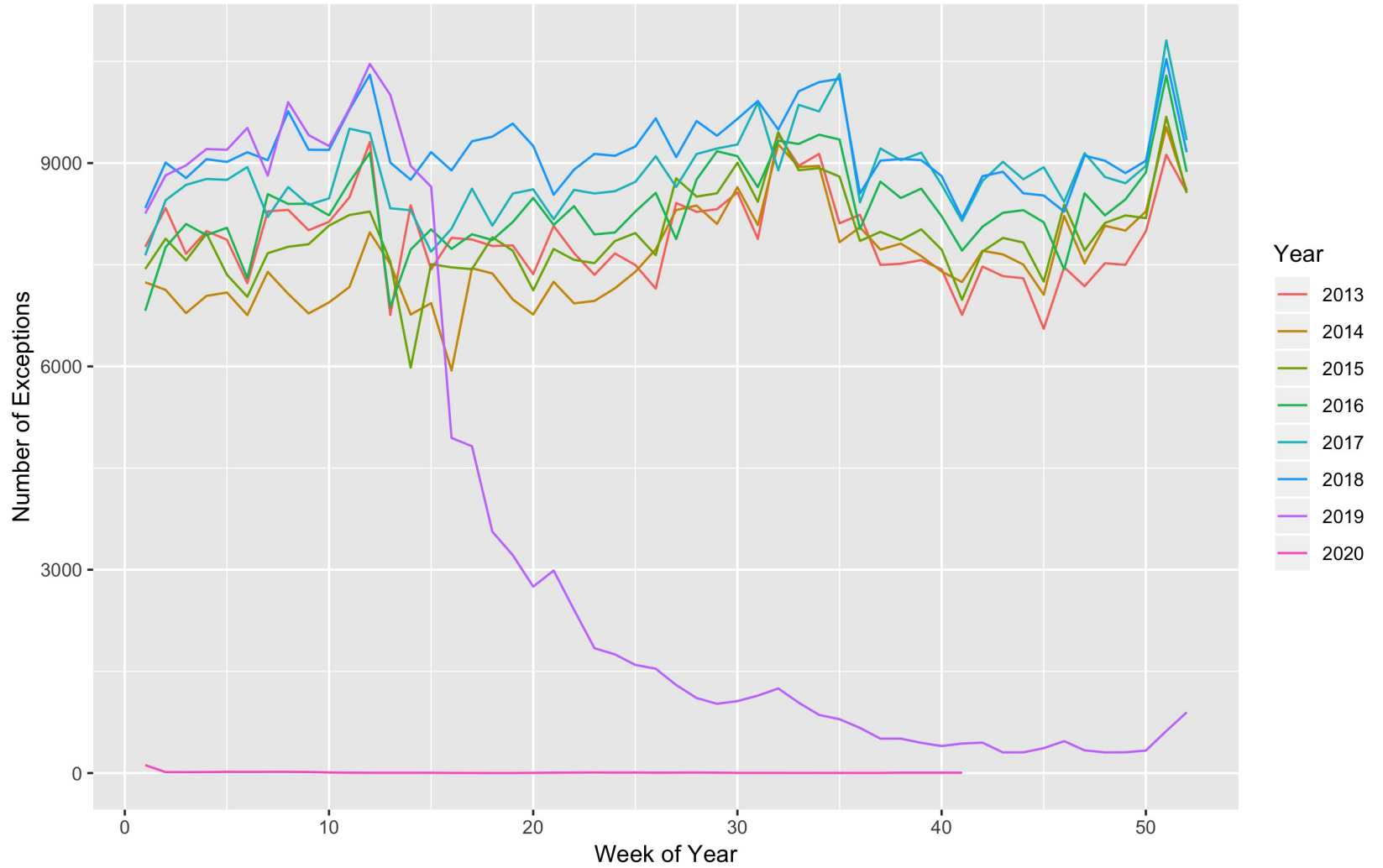
Exception Records by Day, 2018



Exception Records by Day, 2018



Exception Records by Week for each Year



Linear Regression

Neural Network

Timeline

Time Period	Milestone
Week 1	Finalize the proposal report to send to our mentor and partner
Week 2	Data wrangling and feature selection (and more EDA)
Weeks 3 - 4	Explore different approaches to fit the models
Week 5	Build algorithms, testing, adjusting
Week 6	Improve the dashboard, wrapping up
Week 7	Presentations and reports

Thank you!