Digital Transformation of Healthcare

Building a Data Driven Pipeline

Michoel Snow, M.D. Ph.D., Glen Ferguson, Ph.D.

Center for Health Data Innovations

Digital Transformation of Healthcare

- Healthcare Informatics
  - The management and use of patient healthcare information driven by insights gained using health information technology
  - The goal is to provide higher quality care (lower cost, greater availability, new healthcare opportunities) to our patients
- Course Objectives
  - Outline the components which form model bioinformatics pipelines
  - Investigate possible hypotheses for clinical significance and system compliance
  - Characterize hypotheses within the context of healthcare infrastructure
  - Identify stakeholders based on the scope of the project
  - Identify sources of patient data and differentiate the various collection mechanisms/tools
  - Develop a informatics driven research question
  - Assess the quality of the generated data
  - Describe modeling frameworks to analyze the data
  - Contrast methods to evaluate the results of modeling
  - Discuss methods of model implementation and care provider

Course Overview

- Lecture format
  - Each class will focus on a specific part of the pipeline
  - Explore theoretical constructs through discussion and small group work
  - Work through real world cases using theoretical framework
- Final Project
  - Each student will present an informatics project to the class over the last two lectures
- Grading
  - Class is Pass/Fail
  - Grade is based on participation and final project
- Course Leaders
  - Michoel Snow - msnow1@montefiore.org
  - Glen Ferguson - glfergus@montefiore.org

Lecture Schedule

1. Overview of course and introduction to building data driven bioinformatic pipelines
2. Building clinical decision support systems (Implementation)
3. Evaluating study results and model predictions (Modeling and Analysis)
4. Overview of machine learning models - part 1 (Modeling and Analysis)
5. Overview of machine learning models - part 2 (Modeling and Analysis)
6. Assessing data quality and preparing data for modeling and analysis (Data Preparation)
7. Identifying data sources and implementing collection protocols (Data Collection)
8. Calculating economic feasability and impact (Stakeholder concerns)
9. Bioinformatics ethics and stakeholder engagement (Stakeholder Concerns)
10. Healthcare administrative databases (Infrastructure)
11. Exploratory data analysis (Hypothesis Generation)
12. Presentations - part 1
13. Presentations - part 2

Any Questions

?

Objectives

After this lecture students will be able to

- Describe the different phases of a healthcare informatics project
- Diagram an informatics project as a pipeline

Metastatic Epidural Spinal Cord Compression

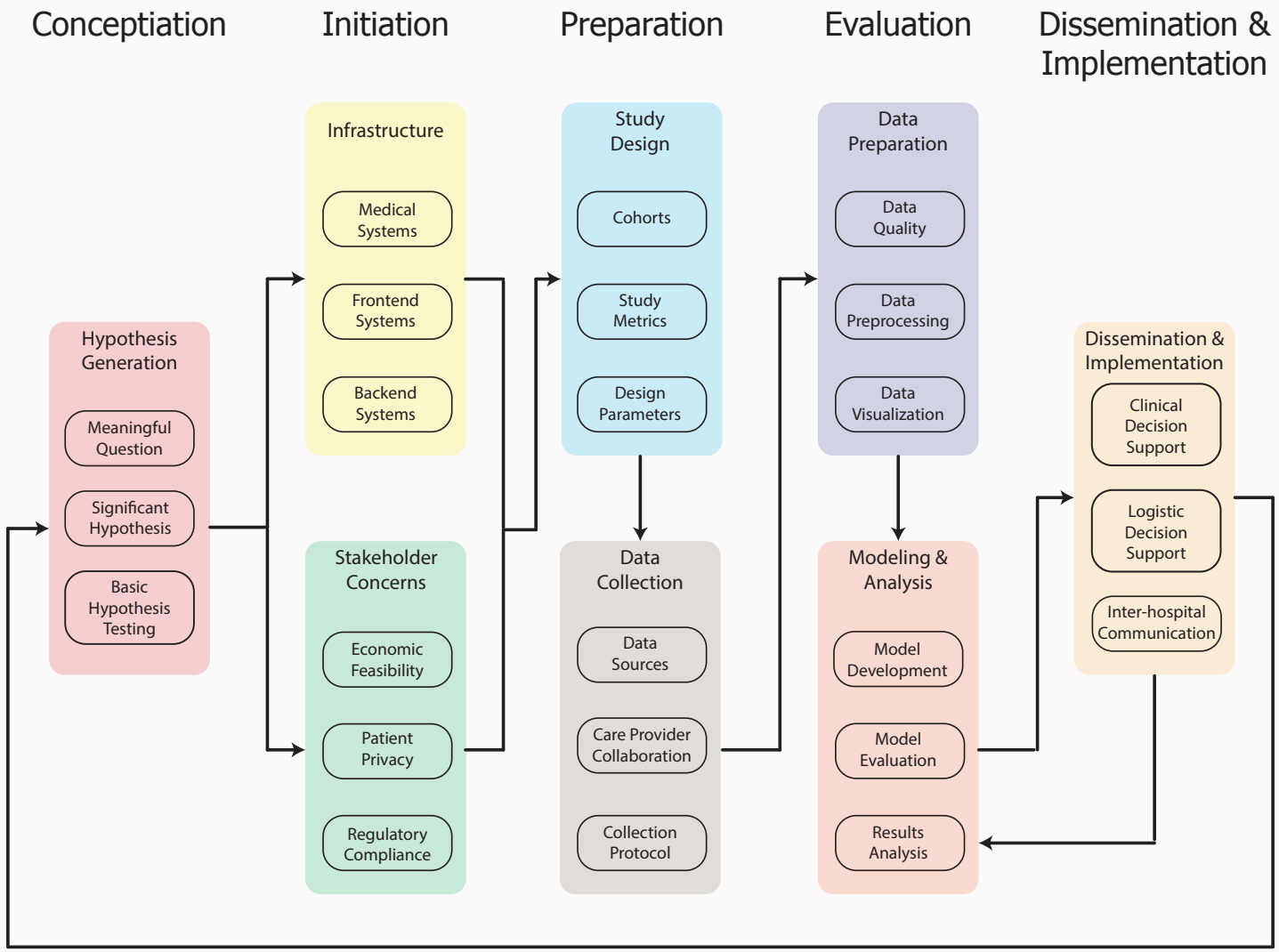
- Overview
  - Occurs in 2% to 5% of all cancer patients
  - Cord compression is the first manifestation in about 20% of patients
  - Survival is generally less than 6 months
  - Prognosis negatively correlates with severity of presenting symptoms
- Diagnosis
  - Clinical Findings + Imaging (MRI or CT)
- Treatment
  - Surgery
  - Radiation therapy

Metastatic Epidural Spinal Cord Compression

- Overview
  - Occurs in 2% to 5% of all cancer patients
  - Cord compression is the first manifestation in about 20% of patients
  - Survival is generally less than 6 months
  - Prognosis negatively correlates with severity of presenting symptoms
- Diagnosis
  - Clinical Findings + Imaging (MRI or CT)
- Treatment
  - Surgery
  - Radiation therapy

Let's build our own pipeline for spinal cord compression

Healthcare Informatics Pipeline



Further Reading

- Weapons of Math Destruction
- Journal of the American Medical Informatics Association (JAMIA)
- Journal of Internet Medical Research
- arXiv.org