Introduction to Data Science

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LNMIIT

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Introduction to Data Science

What ?

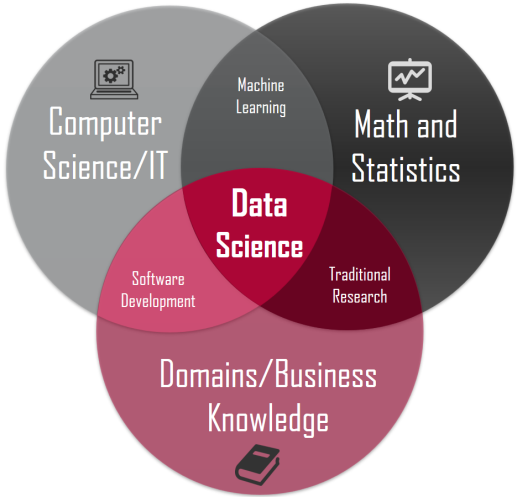

Figure: Interdisciplinary Nature of Data Science. Image: Courtesy of IIT Madras

1. Data science is an interdisciplinary field that utilizes scientific methods, processes, algorithms, and systems to extract knowledge and insights from *structured* and *unstructured* data.

Motivation

Figure: Data is the New Oil

1. High demand for data scientists (cross-disciplines)
2. Data-driven decision making (unraveling insights from data)
3. Contribution to research and innovation

Data Science Lifecycle

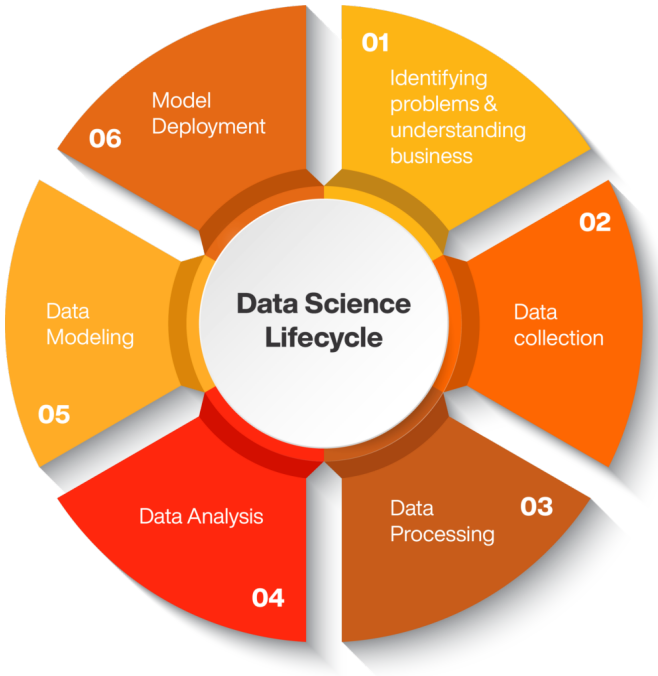

Figure: Data Science Life Cycle.

Data Science Lifecycle

Objective

The ultimate goal of data science is to

1. Derive meaningful and actionable insights
2. Support data-driven decision-making, and
3. Solve real-world problems across diverse industries and domains.

Applications

Finance

Fraud Detection

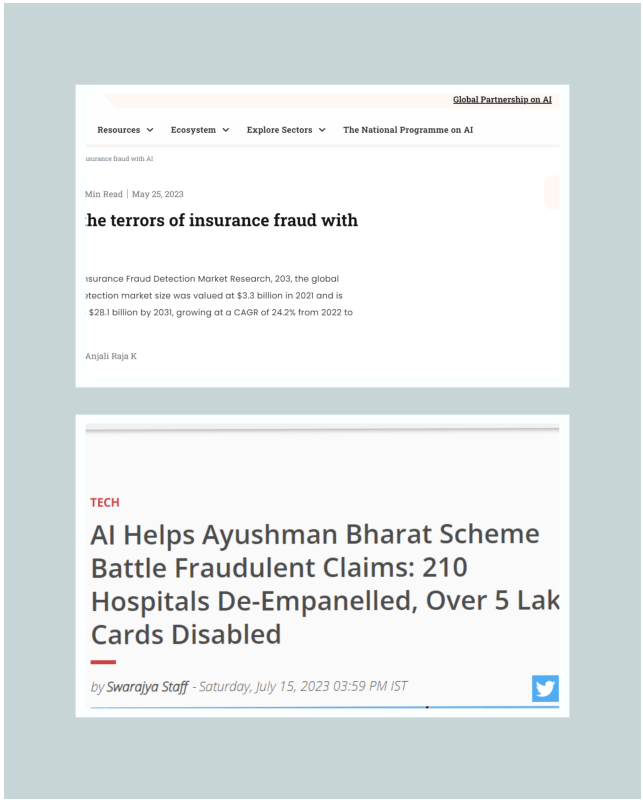

Figure: Fraud Detection using Data Science

Applications

Finance

Risk Assessment

Figure: Risk Assessment using Data Science

Applications

Finance

Algorithmic Trading

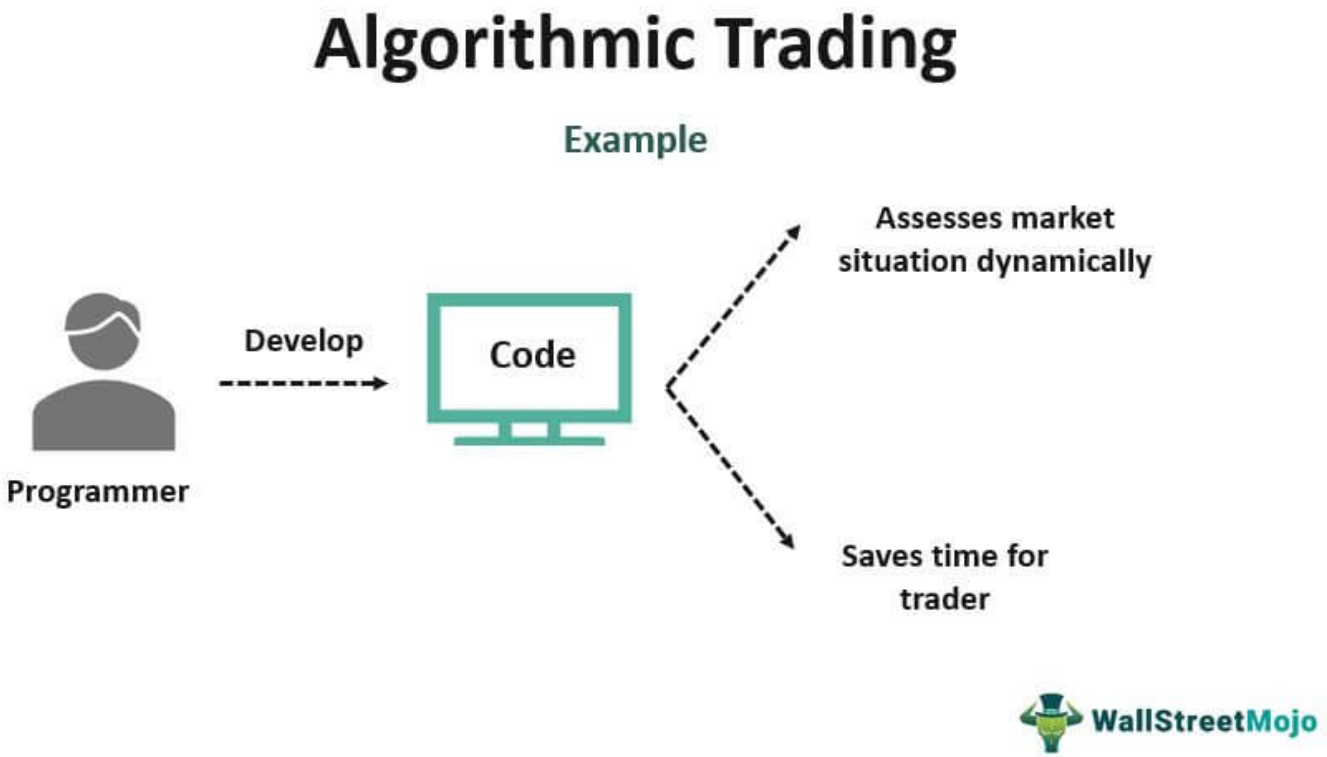

Figure: Algorithmic Trading using Data Science

Applications

Marketing

Personalized Recommendations

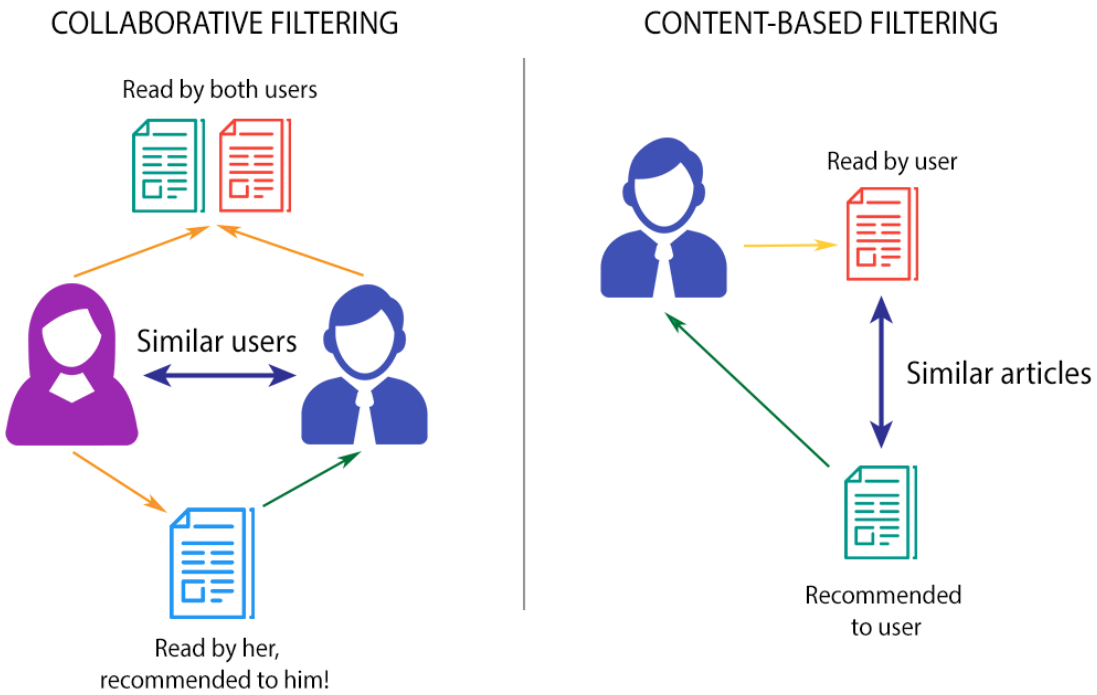

Figure: Designing Recommendation Systems

Applications

Marketing

Social Media Analytics

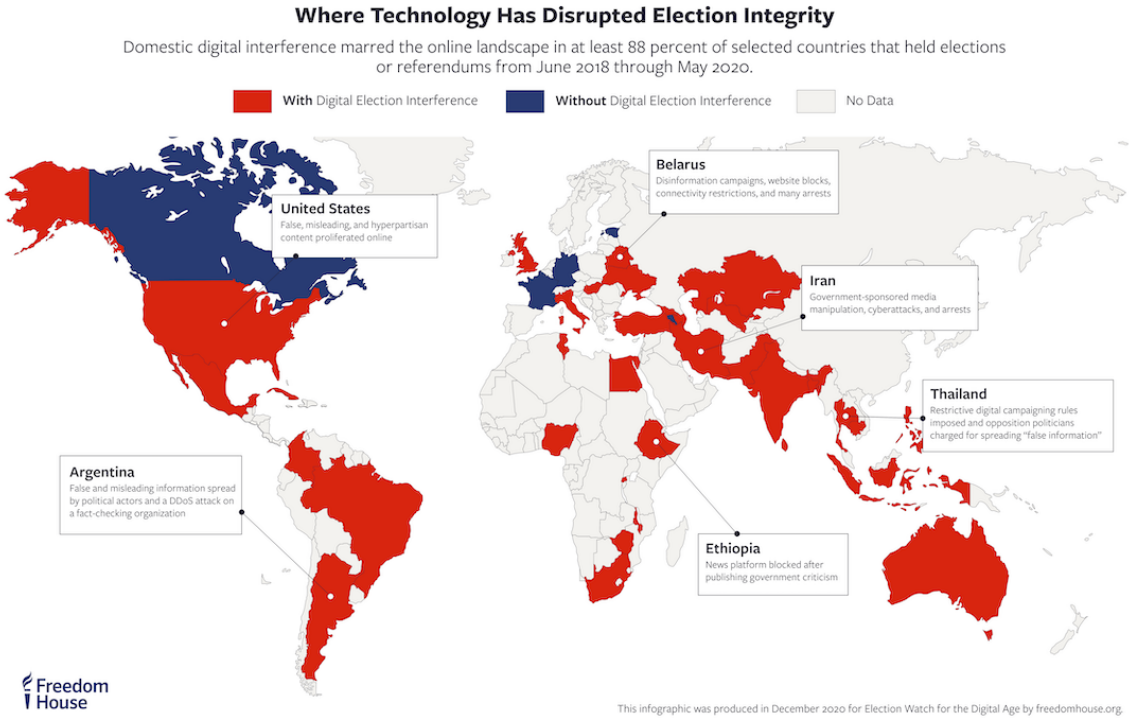

Figure: Social Media Analytics using Data Science

Applications

Marketing

Customer Segmentation

Figure: Customer Segmentation using Data Science

Applications

Marketing

Sales Forecasting

Figure: Sales Forecasting

Applications

Transportation and Logistics

Route Optimization

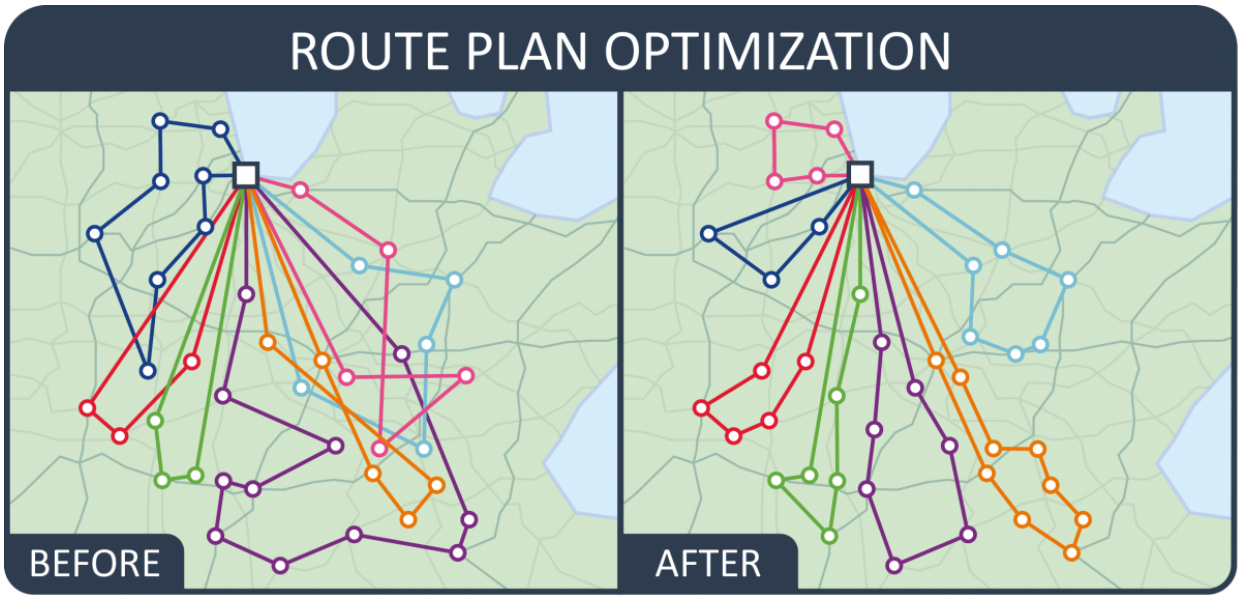

Figure: Route Optimization using Data Science

Applications

Transportation and Logistics

Demand Forecasting

Figure: Demand Forecasting using Data Science

Applications

Transportation and Logistics

Supply Chain Management

Figure: Supply Chain Management using Data Science

Applications

Environmental Science

Climate Modeling

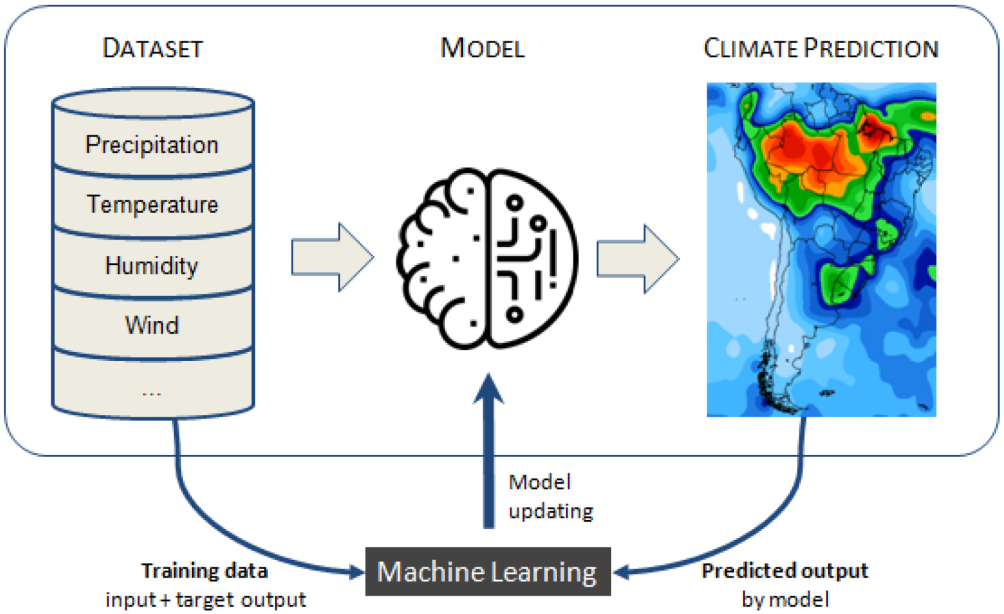

Figure: Climate Modeling using Data Science

Applications

Environmental Science

Natural Disaster Prediction

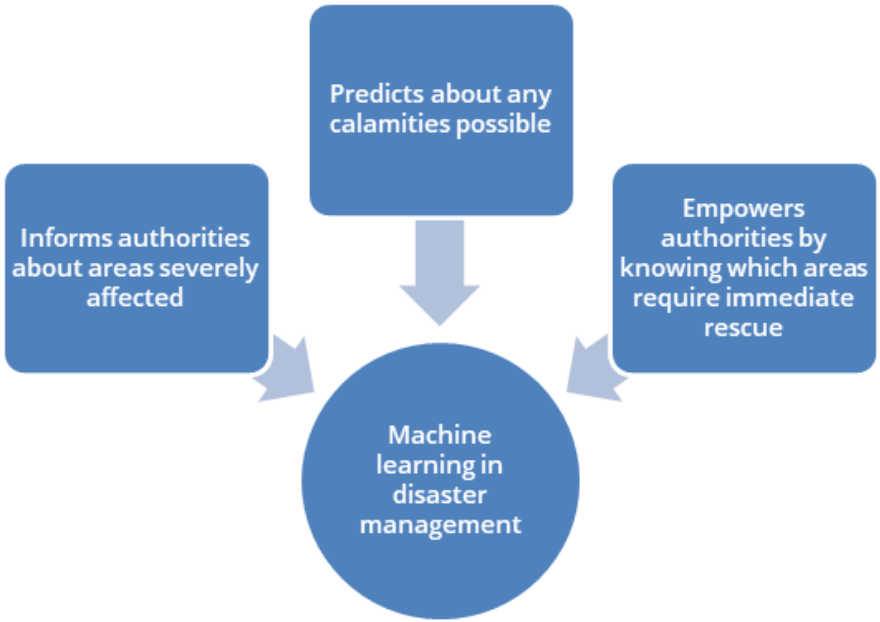

Figure: Disaster Management using Data Science

Applications

Environmental Science

Conservation Efforts

nature › nature communications › perspectives › article

Perspective | Open Access | Published: 09 February 2022

Perspectives in machine learning for wildlife conservation

Devis Tuia, Benjamin Kellenberger, Sara Beery, Blair R. Costelloe, Silvia Zuffi, Benjamin Risse, Alexander Mathis, Mackenzie W. Mathis, Frank van Langevelde, Tilo Burghardt, Roland Kays, Holger Klinck, Martin Wikelski, Iain D. Couzin, Grant van Horn, Margaret C. Crofoot, Charles V. Stewart & Tanya Berger-Wolf

Nature Communications **13**, Article number: 792 (2022) | Cite this article

50k Accesses | **89** Citations | **412** Altmetric | Metrics

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Abstract

Figure: Wildlife Conservation using Data Science

Applications

Healthcare

Disease Spread Estimation

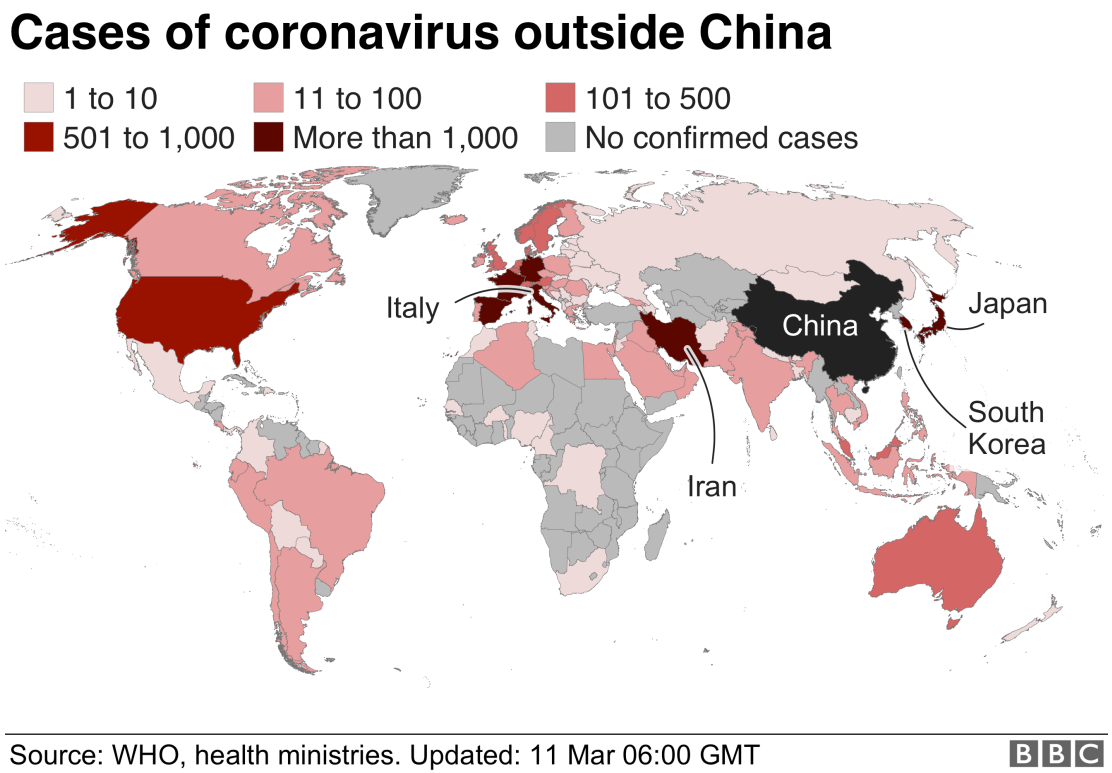

Figure: Disease Spread Estimation

Applications

Healthcare

Peak Prediction

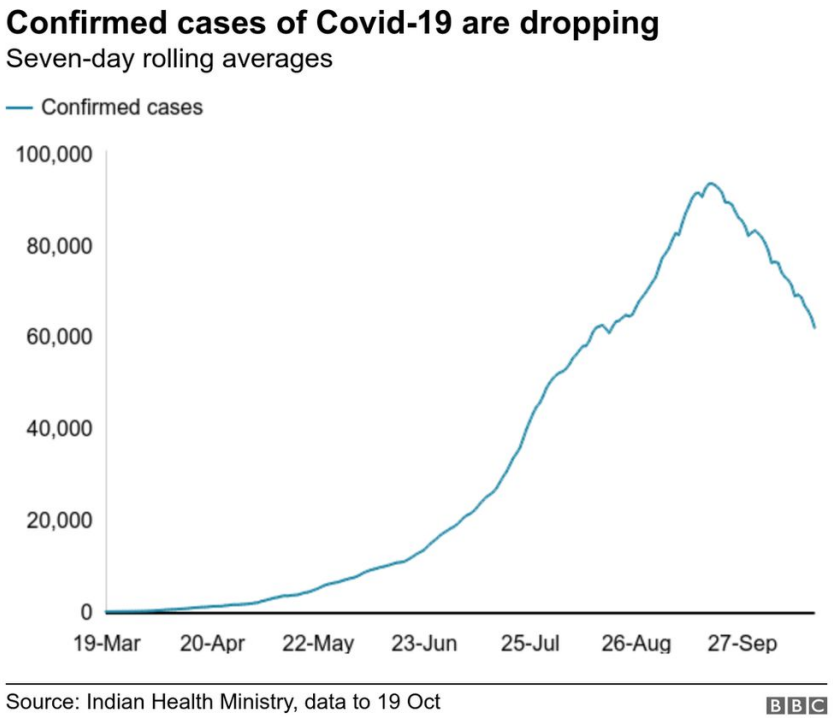

Figure: Peak Prediction

Applications

Healthcare

Preemptive Procedures (Patient Care Optimization)

Figure: Patient Care Optimization

Data Science

Tools and Frameworks

Figure: Data Science: Tools and Frameworks

Challenges in Data Science

Security and Privacy

Figure: Security and Privacy Breach

Challenges in Data Science

Inherent Biases

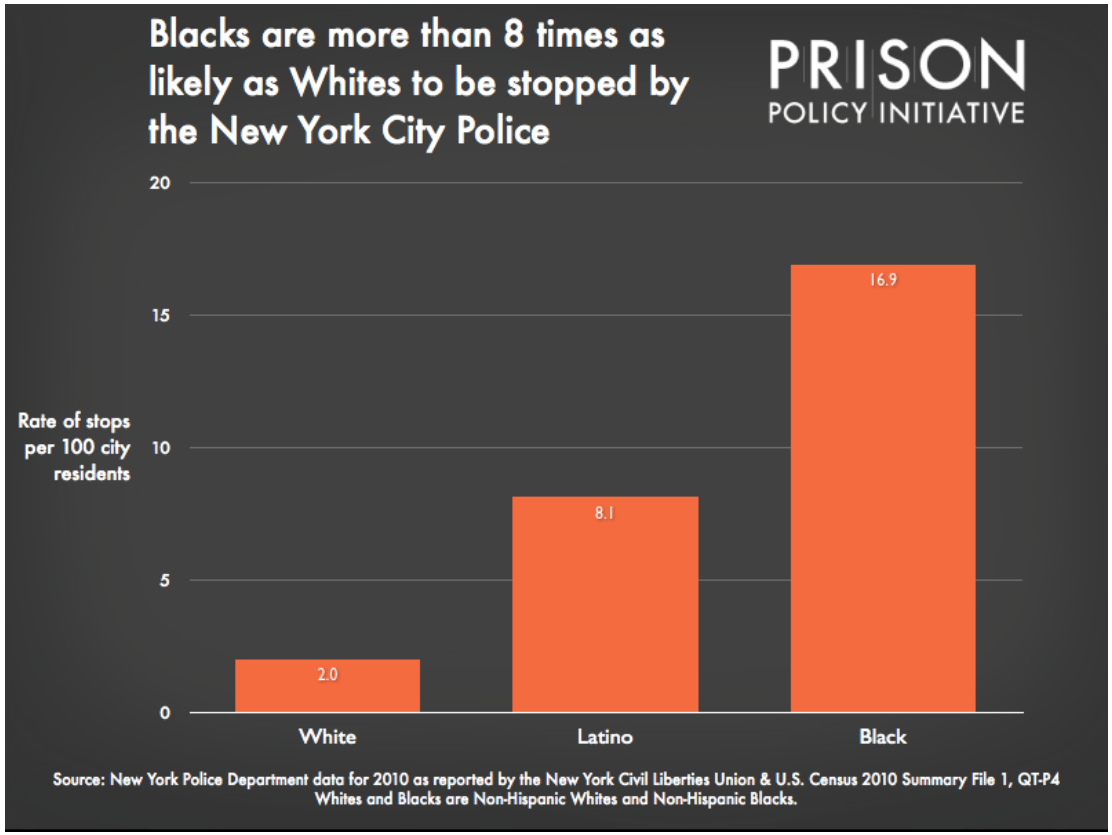

Figure: Inherent Biases: Racial Profiling in US

Challenges in Data Science

Interpretability

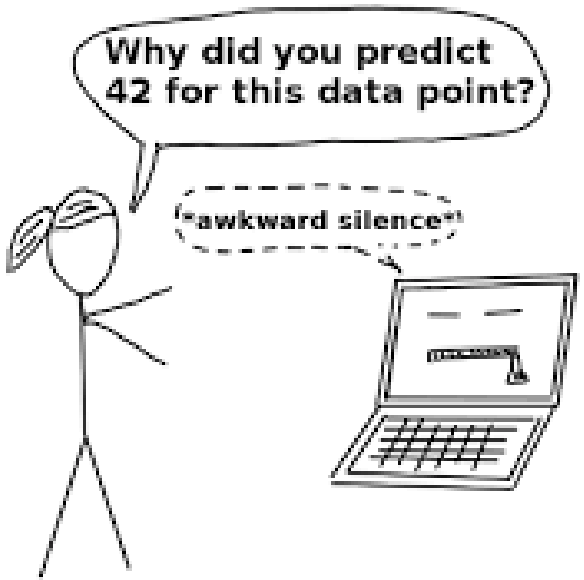

Figure: Interpretability Required for Trustworthiness