Increasing the value of data

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Why Increase Data Value?

- Improve how we plan, act, and respond to a changing world
- Increase the use of the data
- Transform data into information, and information into knowledge
- Provide knowledge to decision makers

The Data Science Roadmap

Frame the problem

Understand the data

Extract features

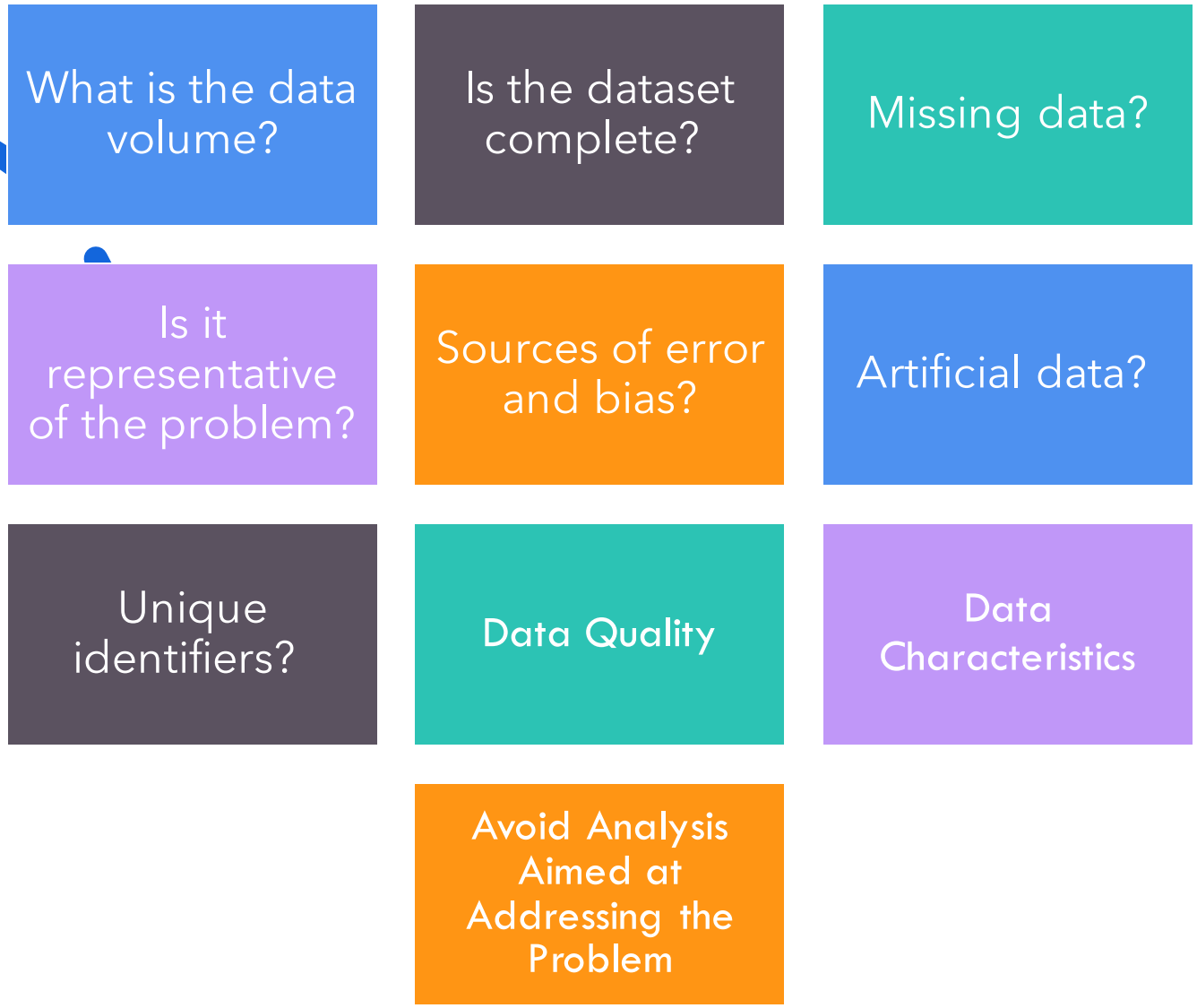
Model and analyze

Publish and deploy

Framing the Problem

- What is the problem?
- What is the question we ask of the data?
- What would constitute a solution?

Understand the Data: Initial Data Analysis



Understand the Data: Exploratory Analysis

Develop an intuition

Test Hypotheses

Exploratory Visualization

Get a 'feel' for the data

Making Scientific Data Valuable

TO THE BROADER COMMUNITY

TO DECISION MAKERS

SEMANTIC WEB TECHNOLOGIES

Where to from here?

I'll (briefly) present a use case currently implementing this approach: GIC and space weather

We'll discuss ideas for embracing this approach, and contributing to a community-wide effort

The Convergence Hub for the Exploration of Space Science

Team:

- PI: Ryan McGranaghan
- ASTRA
- UCLA
- Georgia Tech
- EPRI

Targeted Research:

- Power grid resilience

Space Weather and GIC

1. Identify our user or problem
2. Gain insights into the needs and requirements to address the problem
3. Formulate these needs as questions
4. Initial and exploratory data analysis
5. Identify and formalize relationships between data
6. Transform these data into information which can be accessed on the semantic web (data web)

Semantic Web

THE SEMANTIC WEB
IS A *WEB OF DATA*

W3C – W3.ORG

Semantic Web

LINKED DATA

VOCABULARIES

QUERIES

INFERENCE

APPLICATIONS

Semantic Web – Linked Data

Linked Data – standardized, organized data including explicit relationships

Enables large-scale integration, reasoning, and discovery

Semantic Web – Vocabularies

Language to define the explicit relationships between data

Facilitates data integration and inference

Helps to organize knowledge

Simple Example:

- A magnetospheric modeler may define one aspect of their model as the lower boundary in pitch angle, while an ionospheric physicist may call this boundary the ionosphere. A piece of information that states the lower boundary is in fact the ionosphere is a vocabulary (or an ontology).

Semantic Web – Inference

Discovering new relationships, automatically

Uses existing data and vocabularies (sets of rules, the relationships)

Enables large-scale integration, reasoning, and discovery

Example:

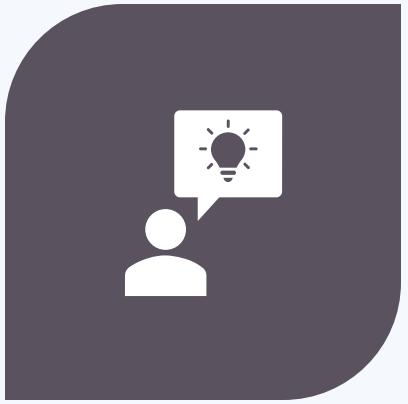
Flipper isA Dolphin

Every Dolphin is also a Mammal **(ontology)**

Flipper isA Mammal

Thoughts? Ideas?

THOUGHTS?



IDEAS?

QUESTIONS?