PRIMRE Research Questions Work

The aim of this report is to serve as a guide for future PRIMRE research. PRIMRE research, used here, indicates all publishable or non-publishable insights mined from documents or data contained by PRIMRE. This collection of documents and data contained by PRIMRE is hereafter referred to as the “PRIMRE universe.”

Motivation

We believe that the expansion of the marine energy industry is good for humanity, and the PRIMRE universe has been cultivated at great expense to promote its development. We subsequently ask the following questions:

* Does PRIMRE succeed in its aim of promoting the marine energy industry?
* If imperfectly, how can PRIMRE be augmented to better serve the marine energy industry?
* What can we learn about the marine energy industry from PRIMRE?

Approach

Electing a pragmatic approach, we might begin by considering our set of available actions, namely:

1. What normative techniques are employed to extract knowledge from data? Can we use those techniques?
2. If we cannot use the normative methods for extracting knowledge from data, what novel methods might we employ in their place?

The natural form of the data will inform how knowledge can be gained, which informs the development of techniques. Thus, our ability to use normative techniques relies upon the similarity in form among normative datasets and the PRIMRE universe. Upon further consideration, we find that the PRIMRE universe does not follow any normative dataset structure as nearly all data contained therein is text-based and only human readable.

1. Normative techniques cannot be applied because the nature of the data presents the following problems:
   1. Unclear objective or application of machine learning
   2. Lack of meaningful categorization scheme to enable data fusion or extraction

1. Because most traditional methods fail because the “PRIMRE universe” lacks necessary structure, we can state with confidence that a technique that successfully delivers insight into the contents and user for PRIMRE data will capitalize on this unstructured nature.
   1. Projects Database mining
   2. Case studies
   3. Literature reviews
   4. Language processing

Research Directions

Because research is generally organized by topic area, and composed of many smaller questions which build understanding of this area, I have elected to first describe four research directions and their comparative strengths to comprehensively present specialties rather than ideas.

Projects Database Mining

The Projects Database mining approach includes normative exploratory data analysis of the Projects Database knowledge hub.

The advantage of this trajectory is that it is very actionable. The disadvantage is that its scope is narrow, and I presume its findings will be uninteresting. As the econometrics saying goes, “If it looks interesting, you’ve done something wrong.” That is to say: exploratory data analysis and linear methods will generate results that are consistent with expert intuition when they are completed correctly. For the purposes of a report showing stakeholders some interesting statistics it might be interesting, but I hold significant doubts that it will provide more than this.

Research questions might include:

* Who are the most active affiliate institutions?
* Who are the most active researchers?
* What researchers and organizations appear in clusters, suggesting working groups?

Case Studies

The case study approach is a research direction composed of many granular case studies, each pertaining to a mock user. Each case study would ask the writer to place themselves in the shoes of an intrigued developer or researcher, and record the research and development process that can be accomplished with PRIMRE resources alone. which each contain a set of pertinent but limited research questions that can be answered using PRIMRE.

I favor this trajectory. The advantages of this path are that a) it is actionable, b) it is scalable, and c) it is flexible. The case study approach is actionable because it does not require specialize code or tools to begin. Because PRIMRE was designed to be text-based and human readable, and we can capitalize on this by working human interaction into the PRIMRE research. This approach is scalable because any number of specific topics can be used as case studies, to increase or decrease the scope of a research initiative. It is also flexible because the areas covered by the case study can adapt to any content that is available on PRIMRE.

Sample case study / research questions:

* Case study on diesel dependent Alaskan coastal fishing village
  + How does a rural community initiate the process of searching for a marine energy solution?
  + What is the process and precedent for permitting a device for a localized application?
  + What is the expected expense to the community of a wave energy converter?

Literature Reviews

Like the case studies approach, the literature review approach would attempt to create insight from PRIMRE content by categorizing questions of interest to prospective PRIMRE users, and answering those questions in a report format.

The advantage of the literature review approach is that it would be more comprehensive than the case study method, in that like questions would be addressed simultaneously. The drawback is that this would require lengthy development to create a systematic framework that is of use to any stakeholder. Additionally, it would quickly become obsolete because all documents would need to be updated for the system to hold value.

Sample Literature Review topics:

Language Processing