Configurable Index Insurance Visualization Toolkit

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Background and Objectives

Unpredictable climate change has negatively impacted food security and livelihoods in developing countries. As a result, these countries often reply on financial tools like index insurance to overcome climate induced losses and manage potential risks for farmers. However, in the past decades, the index insurance design is not accurate enough to offset farmer's actual losses. Therefore, the objective of this study is to develop a configurable visualization toolkit capable of reconciling heterogeneous data sources to derive better insurance products across African countries including Zambia, Ethiopia, Guatemala, etc.

Figure 1. Examples of heterogeneous data sources: a. satellite b. water level c. farmer.

Index Insurance Overview and Existing Tools

Index insurance is an insurance mechanism in which payout is based on the measurement of a variable that acts as a proxy for losses incurred. For example, for weather-based index insurance, index is derived from an environmental variable, such as rainfall. The current major challenge of index insurance is the issue of basis risk which occurs when either payments are issued while the weather event did not occur, or vice versa.

Figure 2. Existing visualization app written in R.

Existing Tools

In order to address basis risk, researchers need to examine heterogeneous data sources to design the index. Figure 2 presents the existing tools written in R Shiny researcher have been using. There are a number of drawbacks of the existing apps: 1. Code efficiency 2. Configuration 3. Version Control.

Toolkit Workflow

In order to overcome the challenges of existing apps, our team designed a new framework utilizing data build tool (dbt) and svelte. Figure 3 goes over the proposed workflow. Currently, we are in the stage of toolkit implementation.
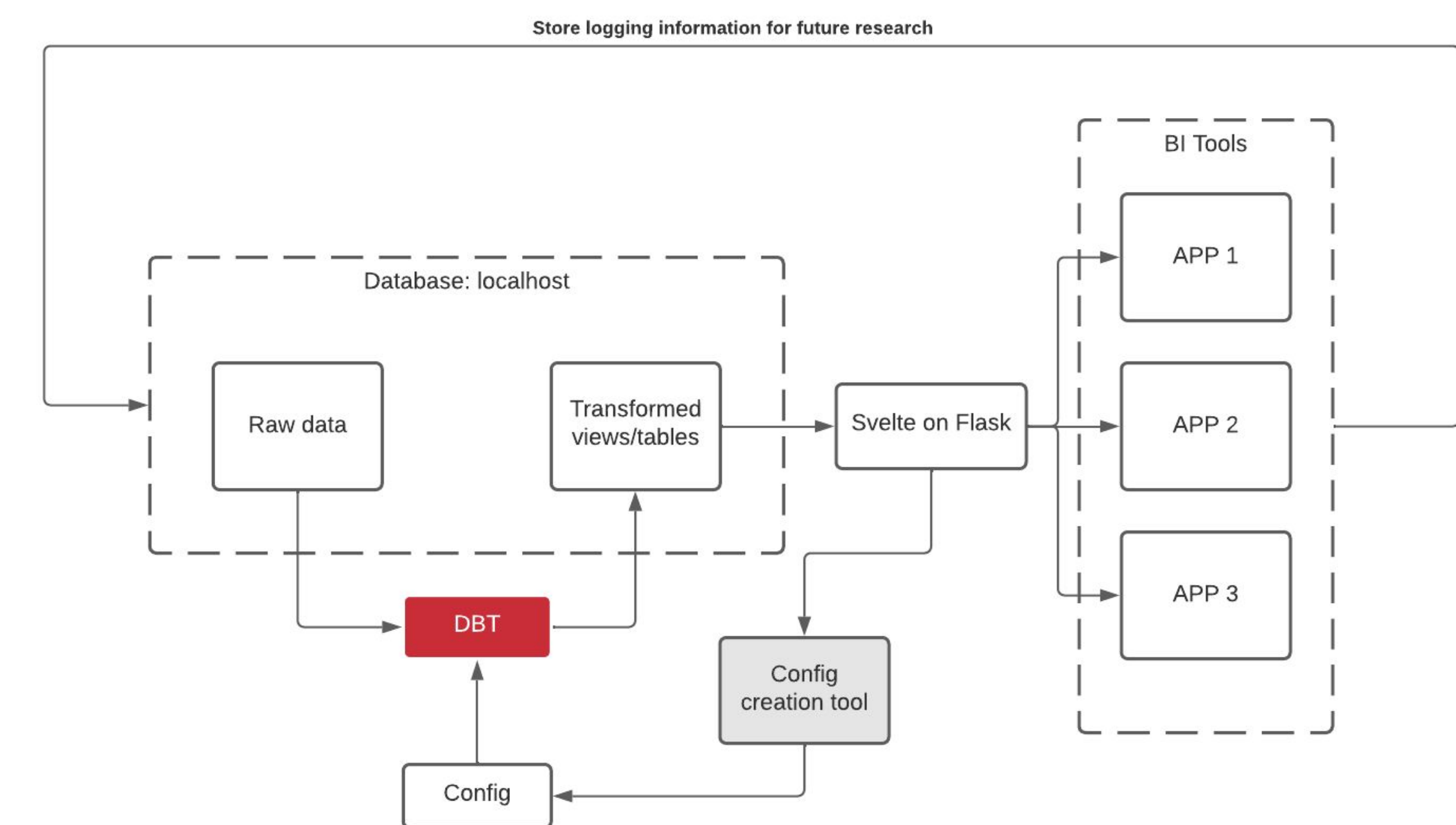

Figure 3. Toolkit workflow.

Challenges

- Wide variety of use cases
  - Exploratory analysis
  - Index design
  - Consolidation
- Developing applications for low-internet uses

Next Steps

The toolkit will allow researchers to answer research questions in both computer science and economics. For example, how to effectively crowdsource data from farmers? How to reconcile heterogeneous data sources to design high quality insurance product?

Acknowledgments

References

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