

Background: Interfaces and Tasks

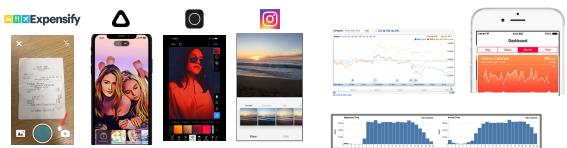
General purpose interfaces:

Can do a lot, but complex to use.



Specialized (Precision) interfaces

Designed for specific task, but easy to use, simple



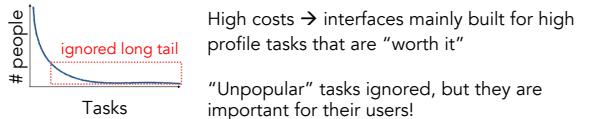
Problem: Building Interfaces is Hard 😞

1. Expensive to learn user's analysis tasks + build interface



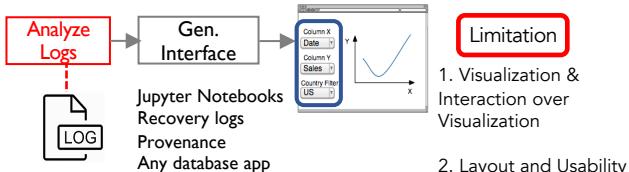
2. Dashboard builders limited in analysis complexity or require programming

3. Prior work auto-generates forms using database contents, but ignores analysis task may be complex if DB has many tables+attrs



Previous Work: Precision interface V1[1]

Query logs as a proxy for analysis tasks to directly generate interface.

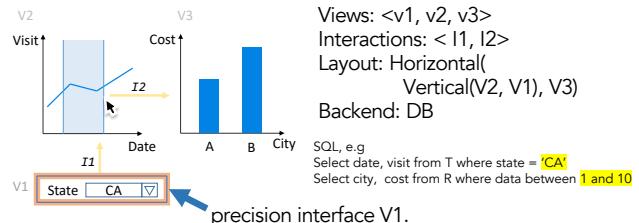


Main Contribution

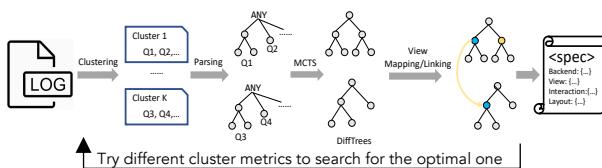
Compared to previous work which only generates a set of widgets, this work enhances the generated interface quality from:

1. Automatically generate an optimal set of views, including widgets and visualizations, and the interaction over the views.
2. Consider hierarchical layout as well as the usability in terms of how easy to express the query log.
3. A generic frontend engine which takes a specification as input and output a web app.

What is an Interface?



Overview

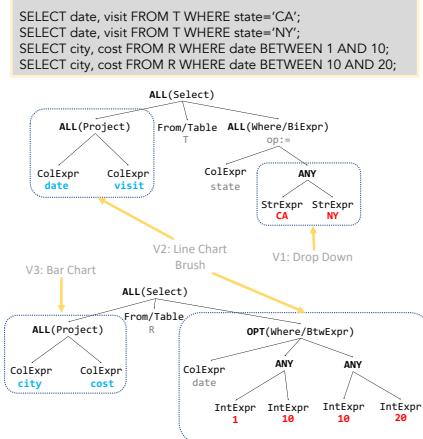


Problem Statement: Given query log, view types,
 Find lowest cost interface and layout where all queries can be expressed.

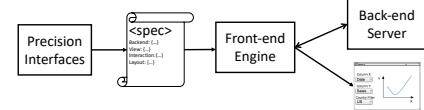
1. Cluster metrics
 - Project attribute union compatible
 - Overall query similarity etc.
2. Parse: Queries modeled as abstract syntax trees
3. Monte Carlo tree Search:
 - The layout and the selected views are intertwined with the process of identifying subtree differences between the input query ASTs. Search space is very large.
 - Method: UCT algorithm
 - Reward: Randomly assign views and greedily link k times to pick the lowest cost.
4. Cost Estimation for view mapping and linking:
 appropriateness of each view + usefulness + layout score

Example: View Mapping and Linking

After we get the final difftree, we search for the optimal view mapping and linking. Layout will be expressed by assigning layout node: Horizontal and Vertical to ALL node.

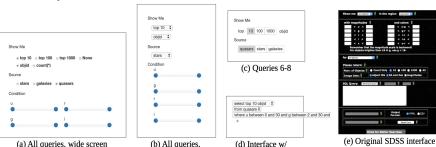


Generic Frontend Engine



Preliminary Results

Layout sensitive interface generated from 10 Sloan Digital Sky Survey (SDSS 2017) queries.



Interactive visualization interface generated from falcon flights query log.

