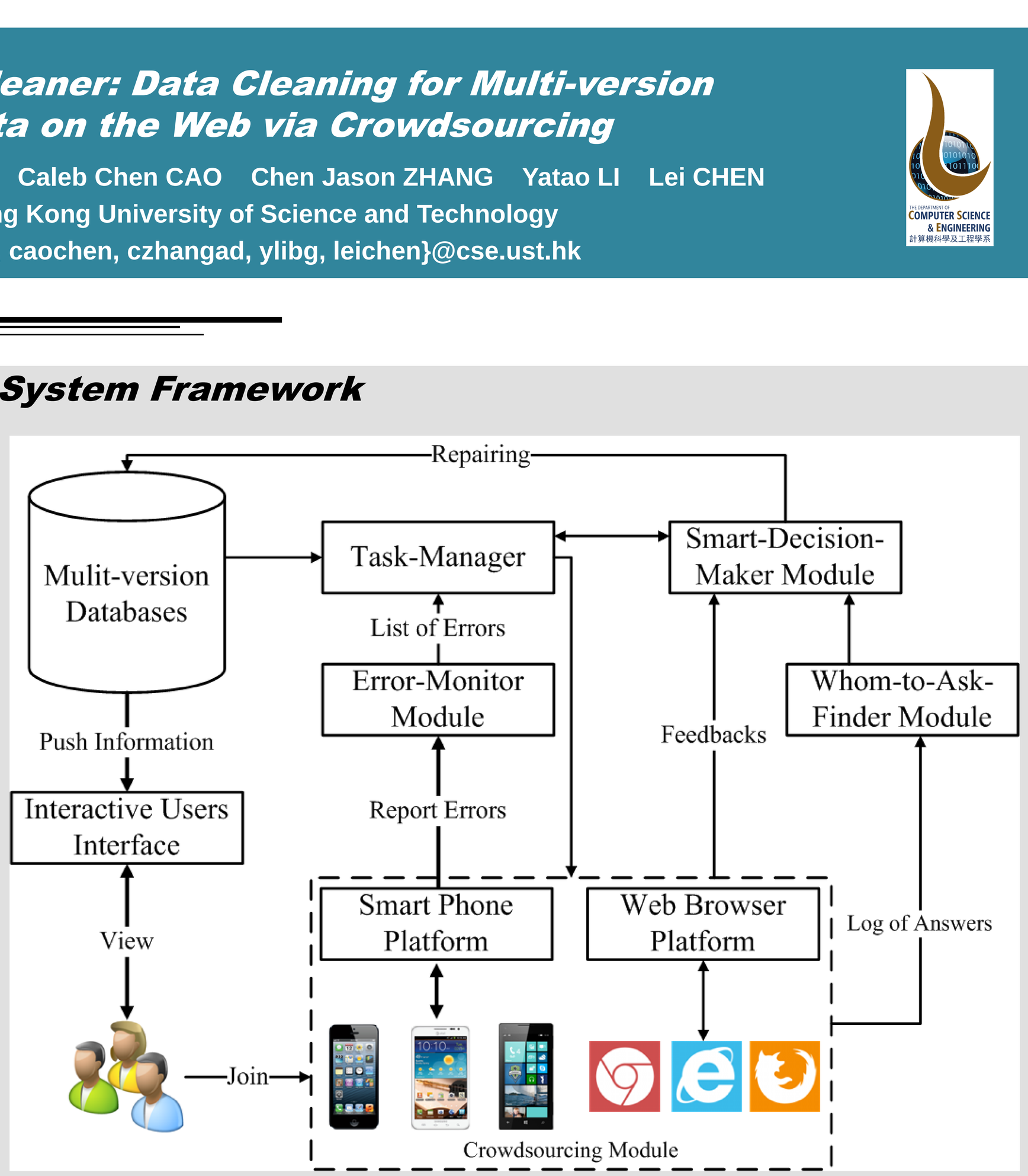
CrowdCleaner: Data Cleaning for Multi-version Data on the Web via Crowdsourcing

Yongxin TONG Caleb Chen CAO Chen Jason ZHANG Yatao LI Lei CHEN
The Hong Kong University of Science and Technology
{yxtong, caochen, czhangad, ylibg, leichen}@cse.ust.hk

Abstract

We demonstrate the following four facilities provided by the system CrowdCleaner: (1) an error-monitor to find out which items (e.g., submission date, price of real estate, etc.) are wrong versions according to the reports from the crowds, which belongs to a passive crowdsourcing strategy; (2) a task-manager to allocate the tasks to human workers intelligently; (3) a smart-decision-maker to identify which answer from the crowds is correct with active crowdsourcing methods; and (4) a whom-to-ask-finder to discover which users (or human workers) should be the most credible according to their answer records.

System Framework



Crucial Modules

- ***Error Monitor:*** It discovers the new errors of multi-version data and evaluates whether each reported error is valuable. Then, the error-monitor module decides which reported errors are the actual errors, or the spam reports.
- ***Task-manager***: It assigns the questions to human workers based on the submitted errors from the error-monitor module.
- ***Smart-decision-maker***: It employs the entropy-based decision strategy to determine whether the answers of human workers are consistent. Thus, each expected repaired result is actually considered as a discrete random variable.
- ***Whom-to-ask-finder***: It finds some credible human workers instead of experts.

Technical Background

- **Entropy-based decision strategy:** From the frequencies of different suggestions, the possibility of each suggestion $x_i (1 \le i \le n)$ is denoted $\Pr(x_i)$. Formally, we define the entropy of an expected repaired result X as

$$H(X) = -\sum_{i=1}^{n} Pr(x_i) log Pr(x_i)$$

When the diversity is too large, we further use the submodularity of entropy to clean the uncertainty of spam suggestions.

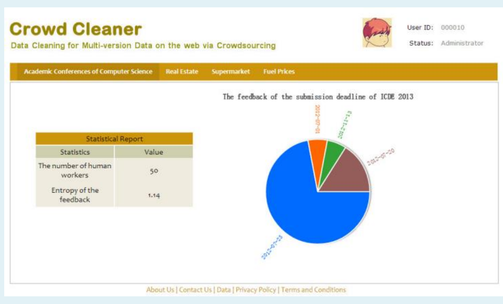
- **Whom-to-ask strategy:** a group of credible workers $CW_n = \{cw_1, cw_2, \ldots, cw_n\} \subseteq W$ with size n, where each cw_i is associated with an confidence c_i, and W is the set of all human workers. Thus, the group confidence of credible workers is

$$GC(CW_n) = \Pr(|C| \ge \lceil \frac{n}{2} \rceil) = \Pr(|C| \ge \frac{n+1}{2})$$
$$= \sum_{k=\lceil \frac{n}{2} \rceil}^{n} \sum_{A \in F_k} \prod_{i \in A} c_i \prod_{j \in A^c} (1 - c_j)$$

the group confidence is used to measure which human workers are credible.

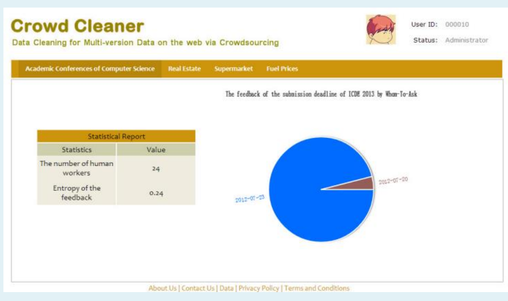
Demo Interface


a. Error report



c. General feedback


b. Clean task



d. Credible feedback

Acknowledgements

This work is supported in part by the Hong Kong RGC Project MHKUST602/12, National Grand Fundamental Research 973 Program of China under Grant 2012-CB316200, Microsoft Research Asia Gift Grant and Google Faculty Award 2013.