ED2: A Case for Active Learning in Error Detection

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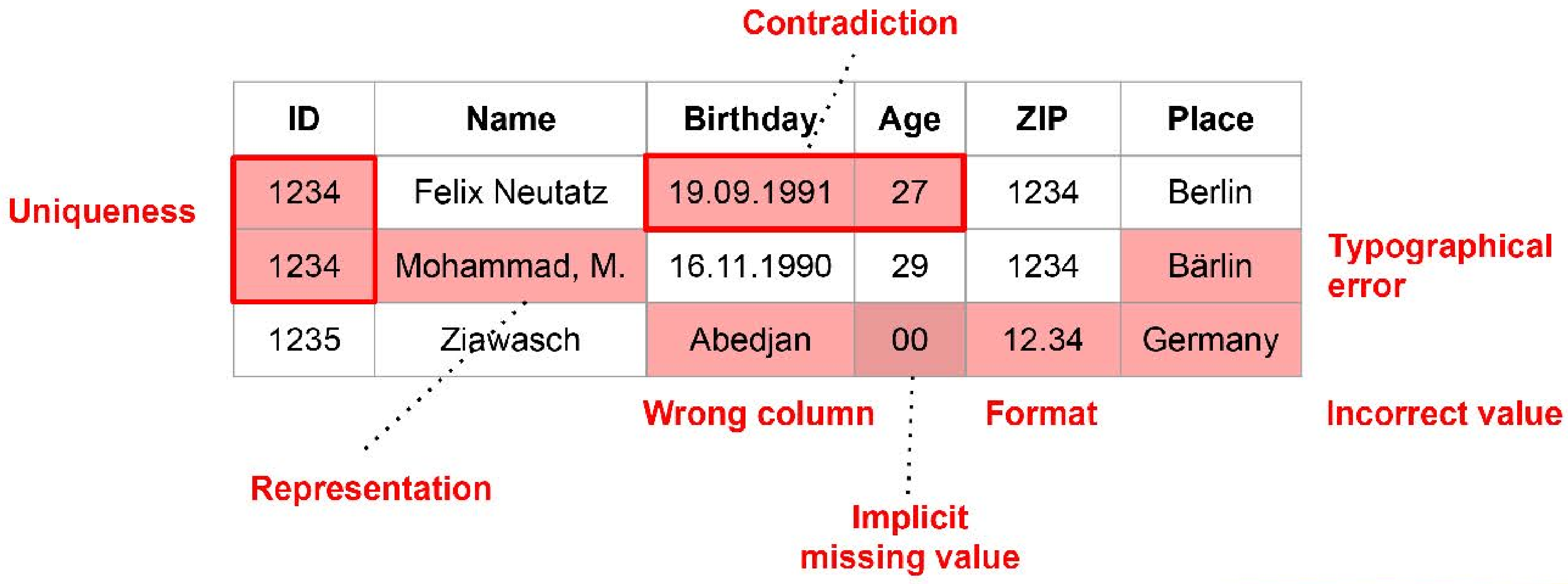
Motivation

Data scientists spend 80% of their time on data preparation. Error detection is a main part:



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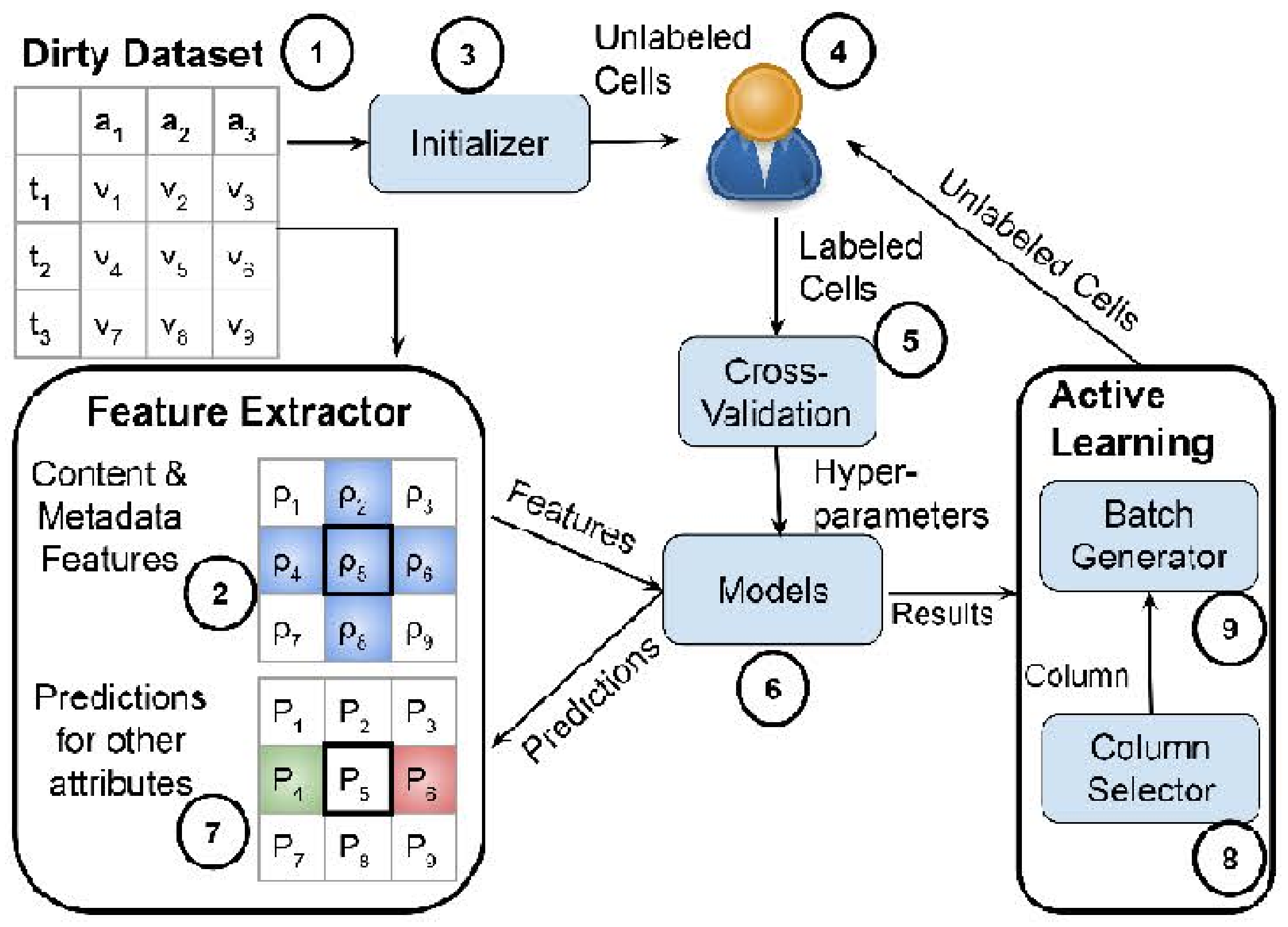
Contradiction
Uniqueness
Typographical error
Wrong column
Format
Incorrect value
Representation
Implicit missing value

Research Questions

- How can we reduce the user labeling effort for classification-based error detection methods [1,2]?
- How can we apply active learning for a two-dimensional relational table?

ED2 achieves state-of-the-art detection accuracy while two-stage active learning reduces the labeling effort by one order of magnitude for large datasets.

ED2 Architecture



1. Column Selection

$$\underset{\text{column}}{\arg\min} \sum_{v \in \text{column}} |P_{\text{column}}(y = \text{erroneous}|v) - 0.5|$$

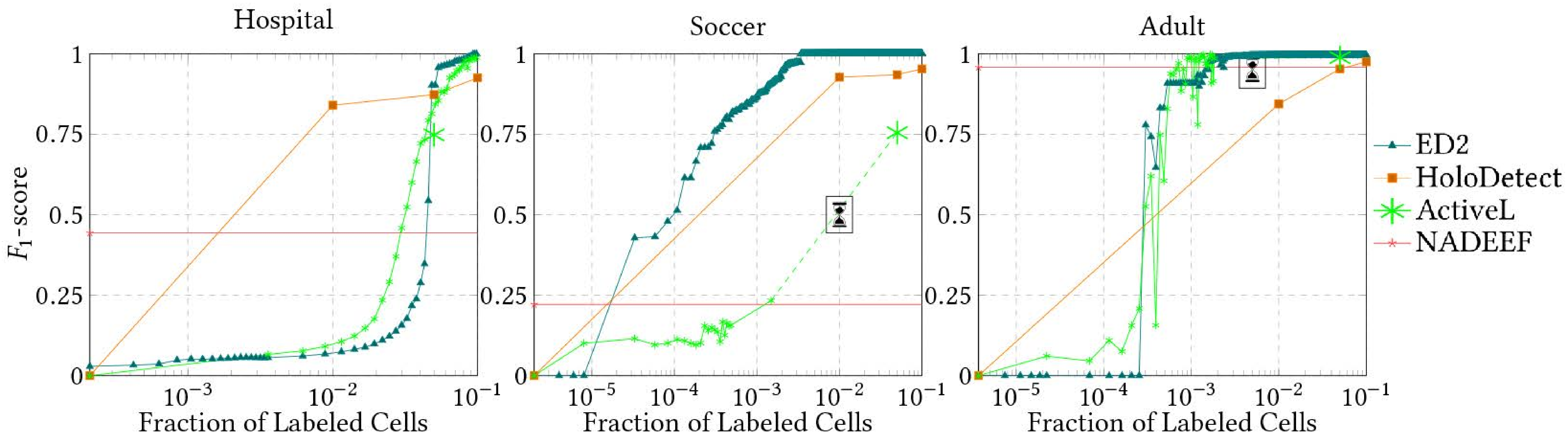
2. Batch Selection

$$\underset{V' \subset V, |V'| = k}{\arg\min} \sum_{v \in V'} |P(y = \text{erroneous}|v) - 0.5|$$

Experiments

Table 1: Experimental datasets.

Dataset	Columns	Rows	Errors
Hospital	19	1,000	2.65%
Soccer	10	200,000	1.56%
Adult	11	97,684	0.10%



[1] Visengeriyeva, L. et al. 2018. Metadata-Driven Error Detection. SSDBM.
[2] Heidari, A. et al. 2019. HoloDetect: Few-Shot Learning for Error Detection. SIGMOD.
[3] Dallachiesa, M. et al. 2013. NADEEF: a commodity data cleaning system. SIGMOD.

Open Source

Our system is available online:
https://github.com/BigDaMa/ExampleDrivenErrorDetection

Acknowledgement

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