COMP 543, Tools and Models for Data Science

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Research #1, Relational Model

This paper [1] was written by E.F. Codd, who wanted to dig into the relational model concept in 1970. Relational model is the foundational model for relational database management system that is built on the amelioration of n-ary relations. The model is basically a data managing framework that manages all data and stores them into a formatted data bank with their relations represented. As this model describes data with its natural structure only, a key advantage of relation model is that it maximizes the independence between of application programs and the representation of the data itself.

The author introduced the normal form for the relations in the database, as well as the main operations on the relations. Usually, when integrating such a huge amount of data, there would be problems aroused such as redundancy and inconsistency, especially in the tree-structured files and network models before the advent of relational database. Therefore, Codd's paper also stated the approaches of dealing with these problems in the relational model.

Based on this ingenious idea, Codd made import extensions on the relational model to support meaningful units search in another paper, "Extending the database relational model to capture more meaning." [2] in 1979. Additional insert-update-delete rules and some well-designed operators were introduced into the previous model as the author attempted to capture more meaning of the data and make the model more semantic. More detailed designation of entities and associations were presented in this paper. The extended model have four personalities: a tabular personality, a set-theoretic personality, an inferential string-formula personality, and a graph-theoretic personality. Thus, the relational model was further improved as a more intelligent system.

References:

[1] Codd, Edgar F. "A relational model of data for large shared data banks." *Communications of the ACM* 13.6 (1970): 377-387.

[2] Codd, Edgar F. "Extending the database relational model to capture more meaning." *ACM Transactions on Database Systems (TODS)* 4.4 (1979): 397-434.

[3] Schek, H-J., and Marc H. Scholl. "The relational model with relation-valued attributes." *Information systems* 11.2 (1986): 137-147.