

Graphs in Lowcode Platforms: a Practitioner's Approach

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Lowcode platforms are on the rise, empowering professionals and tech-savvy individuals to participate seamlessly in software development. These platforms, as environments containing potentially many structured data, are conducive to graph exploitation in various forms. This lightning talk reviews the impact of graphs in Dandelion and Dandelion+, two model-driven lowcode platforms developed to meet the industrial needs of UGROUND, a software firm utilizing semantic engineering for its commercial solutions. In particular, this talk examines:

Graphs as visual comprehension devices. Lowcode platforms support domains that contain numerous data entries. However, many end users that employ applications developed within these platforms may not be interested in examining data in a fine granularity. Instead, they benefit from summaries and data reductions in the form of visual graphs, often arranged in dashboards. Dandelion makes use of *model sensemaking strategies*, a lightweight yet powerful model transformation technique that produces configurable graphs from modeled data.

Graphs as intermediate artifacts for chatbot intents. The study of graphs has a long history in mathematics and computer science, leading to the development and optimization of numerous algorithms for various graph-related tasks. Chatbots that interact with data can leverage these algorithms to execute precise and error-free computations upon user requests. This approach contrasts with unguided LLM responses, which are prone to hallucinate results. Additionally, the intermediate graphs used by the algorithms can be presented to users, providing justification for the accuracy of the answers and aiding understanding. For example, LowcoBot, a code generator for chatbots, utilizes graphs to resolve some chatbot intents, such as navigating a platform's web pages by finding the shortest path between two modeled entities in a dedicated intermediate graph.

Graphs and LLMs for querying knowledge bases. A frequent problem in lowcode platforms is being able to query large knowledge bases. These are typically presented as large file dumps, containing thousands or millions of documents that belong to different domains, thus being highly heterogeneous. In this circumstance, techniques like document embeddings are not effective, as they greatly suffer from *dilution* issues. That is, data is so vast and diverse that, even if a document had a relevant piece of information, it 'competes' against a huge amount of irrelevant documents, thus lowering significantly the probability of being selected. In UGROUND we are exploring the impact of meta-modeling, LLMs, and graphs to accomplish this task. In particular, we propose an approach where the domains of the data are previously modeled in meta-models, so that an LLM can extract the relevant information from the files into models, thereby reducing the degrees of freedom of the problem. Then, the result can be further processed by graphs conformant to meta-models, allowing a focused search that extracts the necessary information when combined with techniques like document vectorization or Hypothetical Document Embeddings (HyDE).

In conclusion, this talk covers the impact of graphs in lowcode platforms regarding artifact comprehension, integrated chatbot tasks and querying knowledge bases.