Knowledge Categories in the Layout Configuration Task

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Abstract

This paper presents the investigation of the knowledge categories involved to the layout configuration task.

Keywords: configuration task, knowledge categories, structured document, document processing.

1. Introduction

We treat a technical drawing as a structured document which contains the drawing of assembled artefact. Therefore, we consider the generation of technical drawings as a layout configuration task.

The task of layout configuration could be divided into the following subtasks: (1) investigation of knowledge categories involved to the task, (2) specification of the drawings logical structure, (3) the specification language for deriving layout from logical structure, (4) representation of static images.

The major categories of knowledge involved to the layout configuration are problem-dependent knowledge and knowledge that remains valid over multiple problem solving sessions [8]. According to the approach used in structured document processing [3], [5] these categories are processed separately.

In the case of layout configuration the problem-dependent knowledge is an arrangement [1] of the assembled artefact. From the document processing point of view the problem-dependent knowledge is the logical structure of the document.

The major categories of persistent knowledge are as follows:

• Domain-specific knowledge. This knowledge pertains aspects of the design domain: the set of types of parametrised components, their hierarchy, properties, ports, constraints. Constraints are local (applicable to a single component) and global (applicable to the part or the whole artefact). In layout configuration domain the knowledge about the partial assembly is given. The specific arrangement is determined during the configuration.

• Method-specific domain knowledge. This knowledge is domain-dependent but specific for a particular solving method (for example visualization conventions).

• Search-control knowledge is specific for a particular method of solving the problem (for example knowledge representation method).
2. Preliminary results

The technical drawing processing method SyntheCAD developed at Vilnius University provides languages for both the specification of the document logical structure and representation the formatting knowledge.

We treat the preparation of technical drawings as integration of two domains:

- **Document preparation.** For specification of logical structure the *Arrangement language* [2] was developed. This language allows the user to express the Document Type Definition (class of possible artifacts) and Document Instance (partial arrangement of the artefact) — a logical structure of the technical drawings.

- **Configuration task.** In order to get the drawing of the artefact it has to be assembled from the given set of components, or the configuration task has to be solved ([4], [6]). This task is solved during the derivation the layout from the logical structure. According to the representation oriented approach the central issue in configuration is finding the correct representation for expressing structure and properties of the problem domain [7]. For representation of the design office expert knowledge, component catalogue and 2D graphics the GCL language was developed

The method proves, that logical structure of technical drawings can be formalized and used further in the configuration.

References

http://www.cs.wpi.edu/~dcb/Config/configuration.html


