

# 漢語親屬關係專家系統

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## 提要

特定領域內知識和經驗集成的專家系統，是近年來人工智慧領域的一個重要課題。漢語親屬關係專家系統主要由三部分組成：預備研究、資訊提取與推理、應用系統。對漢語語料庫進行調查，綜合運用機器自動統計和人工校正兩種操作，構造“辭彙—句法知識庫”；詳盡列舉親屬名詞、稱呼動詞和建親事件動詞，以及它們所涉及各種句法結構，並給出每種結構的語義運算式。語義運算式由謂詞邏輯表示。這一知識庫是資訊提取的基礎，即識別資訊的句法範本。資訊提取也由機器自動匹配來完成。從語句中直接獲得的親屬資訊往往是不完整的，如獲知甲與乙的關係，也獲知乙與丙的關係，但未知甲與丙的關係。需要進行資訊推理，以便把所有蘊含在文本中的親屬關係都明確地表示出來，包括各種可能的歧義情況。通過對漢語親屬詞語的語義特徵和語義關係進行分析，本方案用一階謂詞邏輯設計了一個親屬關係的語義表示和自動推理模型。<sup>†</sup> 首先選取七種語義特徵作為描寫和定義所有親屬關係的基礎，並把這些語義特徵視為謂詞，相關的人物視為變元；然後將特定親屬關係的語義特徵用運算符號“或”、“與”聯結成邏輯運算式，形成親屬關係語義知識庫；最後給出一種簡潔的親屬關係轉換演算法，包括四個運算步驟：（1）

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把兩個已知親屬關係的邏輯運算式連結在一起，（2）使用補充運算規則把運算式中蘊含的資訊全部找出來，（3）使用化簡運算規則把運算式轉化為最簡運算式，（4）從最簡運算式上進行歸一從而獲得答案。這些答案都記錄在同一個“具體人物親屬關聯資料庫”中<sup>1</sup>。

關鍵詞

專家系統 親屬關係 知識庫 句法結構 謂詞邏輯

# EXPERT SYSTEM OF CHINESE KINSHIP RELATIONS

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## ABSTRACT

Expert System integrated with domain-specific knowledge and experience is an important topic in artificial intelligence in recent years. Our program about ES of Chinese kinship relations mainly compose of three parts: preparatory study, information extraction and reasoning, and applications. The integrated use of statistics and manual correction were adopted in the investigation on the Chinese corpus in order to construct Vocabulary - Syntax Knowledge Base which had an exhaustive list of relative names, relative verbs, and verbs about the events in which specific relations were built, and a list of all their various syntactic structures involved. The semantics of each structure was given by the predicate logic expression. This knowledge base was the basis of information extraction, that is, the

syntactic templates used in information identification. Automatic matching by machine was also used in information extraction. The relative information extracted directly from statement was often incomplete, such as the known relations between A and B, B and C but unknown relation between A and C. Information reasoning was required in order to clarify all the relations entailed in text, including all possible ambiguity situation. Basing on the overall analysis of the semantic features and relations of Chinese kindred terms, this program had set up a kindred automatic reasoning model with first-order predicate logic. Seven basic semantic features were chosen at first as the foundation to derive the definitions of all kinship relations. And these features had served as predicates while the character involved as its variables. Then the semantic features of a certain kinship could be connected with disjunction and conjunction operators to form logic expressions of this relation. This was the semantic knowledge base of kinship relations. Finally we offered a succinct algorithm of kinship relation reasoning, including four steps of operation. In the first step, the logic expressions of two known kinship relations were joined together. In the second step, the laws of assistant operation provided all the information entailed in the logic expression. In step three, the laws of simplification operation changed the expression into a simplest one. In the last step, the answer was given from the simplest expression. All the answers deduced from reasoning were recorded in one database.

**KEYWORDS**

**Expert system   Kinship relation   Knowledge base   Sentence structure  
Predicate logic**