

## Chapter 4

# Evolving Concepts

### ABSTRACT

*This chapter describe the evolution of concepts with Concept Parsing Algorithms (CPA) that captures both the conceptual content and the conceptual structure of a context within a domain of knowledge, and results in a comprehensive, schematic description of important concepts at the time of analysis. Online availability of digital books, journals, comprehensive datasets, etc., lead to the evolution of research methods that expand the potential of CPA for exploring co-occurrence of concepts beyond the literature of a particular area in a knowledge domain, that may also include ‘neighbouring’ areas in the knowledge domain. It supports the evolution of the novel research methodology Literature-Based Discovery (LBD).*

### INTRODUCTION

Systematic application of CPA in context within a discipline generates a concept map that reveals hierarchical and lateral links between concepts and their relations. CPA document hierarchical links between super-ordinate and sub-ordinate co-occurring concepts (set  $[C_i]$ ). CPA also document lateral links that reveal relations between the co-occurring concepts (these concepts may also appear elsewhere in the concept map as super-ordinate concepts or as sub-ordinate concepts of other super-ordinate concepts). Systematic application

of CPA captures both the conceptual content and the conceptual structure of a context within a domain of knowledge, and results in a comprehensive, schematic description of its important concepts at the time of analysis.

## **MAIN FOCUS OF THE CHAPTER**

### **Issues, Controversies, Problems**

It is important to remember that, often, conceptual content and the conceptual structure of a context within a domain of knowledge undergoes changes. The diachronic nature of concept maps in many disciplines is one outcome of a feedback-driven process that reflects the continuous scientific scrutiny and testing-against-reality of patterns in the data, new and old alike, and that inevitably results in discovery of new super-ordinate concepts. Recent research documented improvement in class discussions and learning outcomes in high school physics courses taught by physics teachers who took ‘Conceptual History of Physics’ course as part of their Professional Development activities (Garik et al., 2015).

Concept maps are therefore in a permanent state of flux due to the continuing, incremental development of knowledge in particular contexts within a discipline: ‘It is important to distinguish between the concept and its stages. Between one expansion and the next we have one stage of the concept, and after the expansion we have another stage of the same concept’ (Buzaglo, 2002; p. 73).

A recent example is the assembly of the International Astronomical Union (IAU), when it approved on August 24, 2006, by an overwhelming majority, resolutions that re-defined the meaning of the lexical label of the concept “*planet*”. In a preamble, IAU explained the reason for these controversial decisions:

‘Contemporary observations are changing our understanding of planetary systems, and it is important that our nomenclature for objects reflect our current understanding. This applies, in particular, to the designation ‘planets’. The word ‘planet’ originally described ‘wanderers’ that were known only as moving lights in the sky. Recent discoveries lead us to create a new definition, which we can make using currently available scientific information’ (<https://www.iau.org/news/pressreleases/detail/iau0603/>).

IAU resolutions include the following new definitions of “planet”.

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