

Combining Spatial and Lattice-Based Information Landscapes

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Abstract. In this paper we report on practical information visualization aspects of Conceptual Knowledge Processing (CKP), realizing and illustrating Wille’s “conceptual landscapes” in the context of developing a conceptual information system to determine surfing conditions on the South Coast of New South Wales, Australia. This novel application illustrates some (if not all) of Wille’s CKP tasks: exploring, searching, recognizing, identifying, analyzing, investigating, deciding, restructuring and memorizing (all but improving). It does this by concentrating on combining an information landscape with maps of the physical world.

1 Introduction

Conceptual Information Systems (CIS) conform to the 10 tasks of conceptual knowledge processing (CKP) defined in Wille’s Landscape paradigm [1]. These include exploring, searching, recognizing, identifying, analyzing, investigating, deciding, restructuring and memorizing. Experimenting with Wille’s 10 methods motivates this work and provides a design framework for the development of practical problem solving tools in CIS.

A survey of existing Web-based surfing portals reveals their reliance on Webcams and the absence of any analytical features¹²³⁴. These sites rely on low-quality streamed video inputs that are unreliable – they are often off-line, do not work in poor lighting conditions or at night and often “point” in the wrong direction to give any clear indication of the prevailing conditions (see Fig. 1).

Our objective is to improve on these portals by providing a more principled analysis of surfing breaks based on geographic information & weather inputs and showing prototypical images of the breaks based on a variety of weather conditions. By tying this information with maps and a concept lattice we have engineered the first Web-based Spatial CIS.

¹ <http://www.coastalwatch.com.au>

² <http://www.surfit.com.au>

³ <http://www.realsurf.com>

⁴ <http://www.wannasurf.com>



Fig. 1. <http://www.coastalwatch.com> is a popular surfing portal that features many Web-cams and weather forecasting tools for locations around Australia and a limited number of International locations including New Zealand

While the dimensionality of the input data to the system we describe is low, reflecting the detail (or lack thereof) contained within the input primary data sources, the SURFMACHINE system is a prototypical example of a Web-based CIS that integrates (in a natural way) with spatial data and improves the predominant Web-cam paradigm for portals aimed at surfers. The “landscape of knowledge” that results therefore closely reflects the practical knowledge that surfers apply when deciding where to surf.

This paper is structured as follows. Section 2 gives an overview of how beaches are affected by their shape and orientation. Section 3 describes the input source data. Section 4 describes the SURFMACHINE Conceptual Information System (CIS). Section 5 describes elements of the CIS as they relate to Wille’s CKP tasks and Section 6 describes extensions and limitations of this work.