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The Development of a System of Automated Forecasting Guidance Using Analogue Retrieval Techniques

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PREFACE

This work was conducted with the support of the Bureau of Meteorology (which made available its computer programming resources and the use of its computer centre) and an Australian Government Public Service Postgraduate Award. The characteristics of the models that were designed in association with the project were formulated by the author. These characteristics are presented in Chapter 4 and Appendix B. Miss M. Bell of the Bureau was responsible for the computer programming associated with the study.

ABSTRACT

Firstly, a review of the literature on automation, as it relates to operational meteorology, is presented. The survey provides a broad picture of the effects of automation on the science. To summarise: computer technology has had an enormous impact on the weather forecasting industry. Both productivity and accuracy have increased as a result of its advances. However, a consensus view among meteorologists on how to take best advantage of the trend towards automation has not been reached. The influx of guidance material into operational centres is intimidating forecasters and reducing motivation. This 'meteorological cancer' is beginning to erode hitherto all-time high levels of forecast quality. The experience in the United States suggests that for the time being, motivation producing measures, if adopted, will successfully counteract this effect. However, guidance material is continuing to improve, and in the future man may be unable to add significantly to a wide range of guidance products. At this point it may be found profitable to issue these products directly to the user without modification and to apply the available human skill to other forecast areas.

Secondly, the development of a system capable of providing automated guidance for the prediction of all elements included in a public weather forecast is described. A preliminary model, which is based on the principle of single analogue retrieval, was designed during 1974 and 1975. The single analogue model forecast is simply a description of the weather observed on the day following that of the most analogous synoptic situation to the current situation. The model was subjected to a test during October 1975. Its forecasts were significantly poorer than those issued officially by the Bureau. The analogue statistics concept evolved from the single analogue model. The analogue statistics system retrieves a number of analogues to the initial circulation or to a prediction of the next day's circulation and the guidance is based on a statistical analysis of associated observed weather. During the spring of 1978 a pilot model employing the analogue statistics approach, which was designed specifically to provide guidance for Melbourne and only during the month of October, was subjected to a trial of its skill. The results of the trial are encouraging, the performance of the system during this period being only marginally inferior to that of the official product, and suggest further development of the technique.