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Proposal for a Multinational Project on the Coordination of Fishery Hydrographic Activities in the North Atlantic

by

Frank Fuchs

Institut für Hochseefischerei und Fischverarbeitung
An der Jägerbäk 2, DDR-2510 Rostock 5
German Democratic Republic

Introduction

The complexity of fishery hydrographic investigation requires coordination of all relevant activities on an international platform. Cooperation among wide spread participation could yield the following advantages:
a) access to a multinational database
b) improvement of fishery hydrographic statements based on a quantitatively increased database
c) optimization of ship operation with regard to areal cover of observations and a continous measuring programme along standard sections
d) activities concerning cost-intensive projects (e.g. large-scale surveys, remote sensing) could be shared
e) consideration of the North Atlantic Ocean as an entire system

Although the task to fullfill the outlined proposal is a very ambitious task, it could be worth to discuss this plan along the lines as given in Fig. 1.

Project Proposal

1. Database
- all participants of the project get acces to the database according to their input to the project
- an international network is necessary for the operational data analysis. Technical possibilities are to be explored

2. Content of database
a) fishery data
- standardisation of all catch data and additional catch information
- for data analysis of the proposed concept a classification of catches seems useful (see expert system) e.g. 5 classes: very small catch 10
small catch 10 to 30
medium catch 30 to 70
large catch 70 to 90
very large catch 90 to max. catch

This method could ease standardisation of catches in an international project, with different ship and net types involved.
- physiologically induced changes in behaviour should be noted in the database by corresponding information
- larvae surveys

b) Hydrographic data
- installation of a hydrographic database relevant to fishery, with biotic data included
- to increase clearness criteria for discrimination should be discussed (e.g. fishery hydrography data originating from commercial fishery, standard observations made by research vessels, regional discrimination).
- data out of this database have to be retrievable at their different stages of processing (e.g.

original data for hydrographers, corrected standard data (for fishery biologists)

c) Remote sensing data
- all satellite sensed information, relevant to fishery should be used (NOAA, CSZA and mikrowave sensors)
- calibration of satellite information by means of the hydrographic database
- data handling should be achievable on IBM PC-compatible computers

d) Meteoroloy data
- the database has to be organized in a system that enables relation of each fishery haul with air pressure, air temperature, wind direction, wind speed (availability of sun shine duration, lunar phases, ice cover should be optional)

It is the aim of the database to have as much data sets available as possible in the following form: geogr. latitude, geogr. longitude, fish species, physiological status of fish species, catch class, additional information on catch, hydrography, meteorology.
These data sets form the basis for a further mathematical-biological interpretation. The proposal for this analysis is a special expert system provided by **SCHINDLER (1989)**. In contrast to conventional systems which work rule-orientated, this expert system is based on pattern recognition. It can be used for automatic classification and valuation of complex facts. The expert system-shell, which enables both the classification of catches, and the storage of knowledge, simulates a kind of artifical intelligence.
The working procedure of this expert system is as follows:
- the learning material is offered to the system. This is in our case the coupled data sets of fishery data, hydrography and meteorology.
- out of this material the system extracts the class characteristics
- unbiased treatment of catch class characteristics enables the estimate of influences of biological, hydrographical, meteorological and astronomical data on the catch data
- classification analysis of the system is done as follows: the individual variables are offered to the system, it is not necessary that each data set contains all above mentioned parameters
- the system proposes to which class the individual case should belong. Concurrent the percentage of similarity with available classes and the confidence interval are given
- during learning mode the system waits for the decision of the user, whether he accepts the proposal of the system or not. Optionally the user may decide for another class which he has to enter. The accepted cases will be stored as knowledge.
- following these lines, the user may establish his own knowledge database.
- is an unknown case offered to the system (number of variables), the attributes are converted to patterns (catch classes). This procedure is selected in the forecast mode.

These comments may be used as a first step to the expert system. A basis for an effective discussion could be consultation of specialists, which might also lead to other methods of analysis.

4. Oceanographic analysis
The experience of analyzing hydrographic time-series should be used. Incorporation of results into the expert system should be considered for future work.
The possibility of computer graphic analysis (methods of analogy conclusion) should also be considered.

5. Objectives
- to further our knowledge on fish-environment-relations with regard to the physiological state of the catch object.
- unbiased estimate of biological stocks
- enlargement of the field of investigation to the North Atlantic, with all available data included, to form a complex possibility of analysis
- establish short-term forecasts for the commercial fishery

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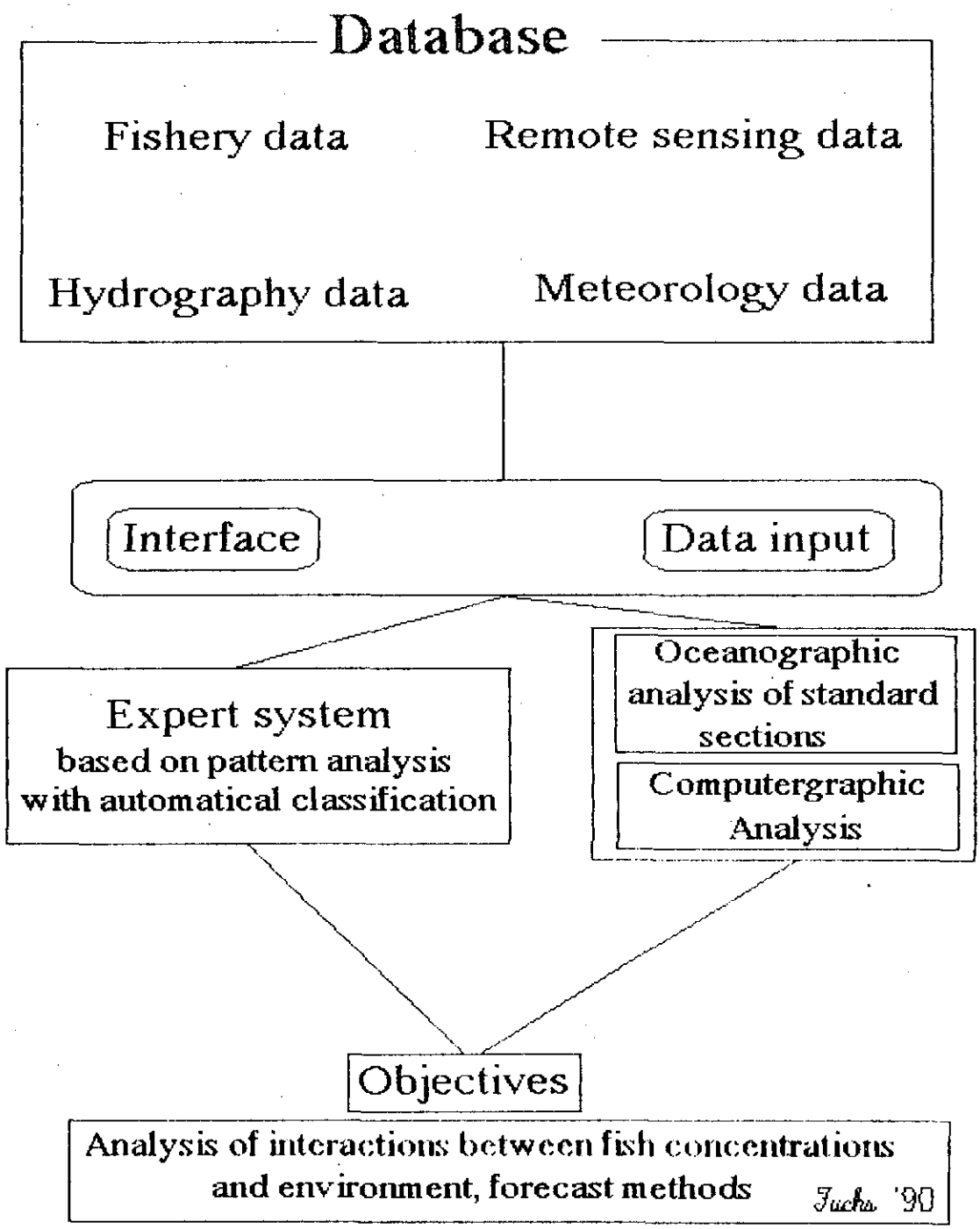
Reference

SCHINDLER, 1989: Expertensystem von Dr. Schindler und Partner.
Die Computerzeitung 27/89: 27-28.


Database
Fishery data
Remote sensing data
Hydrography data
Meteorology data
Interface
Data input
Expert system
based on pattern analysis
with automatical classification
Oceanographic
analysis of standard
sections
Computergraphic
Analysis
Objectives
Analysis of interactions between fish concentrations
and environment, forecast methods
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