Predictive Analysis of the Atypical Water Level Time Series Data of the Texas Coast through Statistical Modeling

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Abstract

Accurately forecasting water level has been a long-standing goal for the Texas Coastal Ocean Observation Network (TCOON) and the Division of Nearshore Research (DNR). The pertinence of the precision in water level predictions has been noted in several publications with the areas of legal proceedings, economics, the environment, as well as safety and navigation, being the leading basis for research in this area.

Data for this study will originate from the TCOON database. TCOON has been in operation since 1988. Consisting of approximately 50 stations along the Texas coast, each station collects various data samples including water level. Water level, collected according to National Ocean Service (NOS) standards, is transmitted back to TCOON at six-minute intervals by line-of-sight packet radio, cellular phone, or Geostationary Operational Environmental Satellites (GOES). It is then processed and stored in a real-time, web-enabled database.

This study will be a predictive analysis of water level time series collected at selected locations along the Texas coast. According to SPSS, Inc., predictive analysis assists in connecting data to effective action by drawing reliable conclusions about current conditions and future events. The particular area of predictive analysis focused on in this study will be interpolation by means of a composite linear regression model.
Related Work


Justification

Forecasting can be a very beneficial field. However, many forms of forecasting are too computer intensive to deliver adequate predictions in real time or simply do not
reach an acceptable level of precision. In addition to offering efficiency and suitable accuracy in forecasting water level as well as demonstrating my aptitude in this topic, this study will further research in our environment therefore enriching the institute of Texas A&M University-Corpus Christi and the surrounding area.

Research Addendum

After researching methods being used for water level prediction, statistical methods will be studied and applied to the problem of interpolation of spans of missing data within a water level series. This will involve linear regression. A computer program written in Perl/PDL will be written to perform interpolation in two orientations to the data. The program will then be tested using existing data from the TCOON database. Statistics regarding accuracy will be calculated according to NOS standards. From these statistics, conclusions regarding the precision and efficiency of the program will be established.

Theoretical Results

Upon completion, this program will produce complete data sets from incomplete data sets for water level values at selected locations. The program will then be integrated into the TCOON real-time web-enabled database in order to deliver complete and adequately accurate water level series’ upon demand.
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