Forecasting techniques for short-term demand of hotel bookings

Abstract

Although the practice of Revenue Management in airline companies dates back to the early 1970s, only recently it has expanded to the tourism industry, owing to the availability of large amounts of reservation data [1]. Hotel revenue managers make decisions about disposable rooms and their rates, with the ultimate goal of maximizing expected revenues or profits. This in turn requires detailed and accurate forecasts of client arrivals. The data used for demand forecasting are based on either current booking activities (reservations) or historical information regarding daily arrivals or rooms sold. While the latter is naturally adapted to conventional methods of time series forecasting (e.g. exponential smoothing, Holt-Winters, ARIMA...), the former have called for the development of ad-hoc techniques, exploiting the unique characteristics of partial booking data. Although incomplete, these data can play a major role in the forecasting process, making it more responsive to demand shifts. In this work we focus attention on the "pickup" method, an advanced booking technique which has gained increasing popularity in the context of hotel Revenue Management. Based on the idea of estimating increments of bookings to come from incomplete booking matrices, the pickup method aims at ultimately forecasting the final number of client arrivals by rate category (and, in some cases, room type) for every day in the future within a given horizon. As reported in current literature [2], pickup forecasts are usually derived from simple or weighted averages of booking increments after removing atypical events, such as promotions, conventions, holiday weekends...

The purpose of this work is to improve upon current forecasting practices by combining pickup techniques with statistical survey methodologies. Advanced booking data on a room-by-room basis bear a close resemblance with event history measurements, in which an event of interest corresponds to the arrival of a booking request for a specific room and a given future date. Data contained in historical booking records are necessarily censored by the presence of booking and capacity limits on past demands. For these reasons, we develop a variety of forecasting methods which nest statistical tools from event history analysis into current pickup practices [3], additionally incorporating external events which are likely to influence booking decisions. The proposed methods are illustrated through applications to real data sets of hotel reservations, processed with SPSS and Matlab algorithms.

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References

