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## Pre-Production Forecasting of Movie Revenues with a Dynamic Artificial Neural Network

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### *Abstract*

The production of a motion picture is an expensive, risky endeavor. During the five-year period from 2008 through 2012, approximately 90 films were released in the United States with production budgets in excess of \$100 million. The majority of these films failed to recoup their production costs via gross domestic box office revenues. Existing decision support systems for pre-production analysis and green-lighting decisions lack sufficient accuracy to meaningfully assist decision makers in the film industry.

Established models focus primarily upon post-release and post-production forecasts. These models often rely upon opening weekend data and are reasonably accurate but only if data up until the moment of release is included. A forecast made immediately prior to the debut of a film, however, is of limited value to stakeholders because it can only influence late-stage adjustments to advertising or distribution strategies and little else.

In this paper we present the development of a model based upon a Dynamic Artificial Neural Network (DAN2) for the forecasting of movie revenues during the pre-production period. We first demonstrate the effectiveness of DAN2 and show that DAN2 improves box-office revenue forecasting accuracy by 32.8% over existing models. Subsequently, we offer an alternative modeling strategy by adding production budgets, pre-release advertising expenditures, runtime, and seasonality to the predictive variables. This alternative model produces excellent forecasting accuracy values of 94.1%.

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