

Machine Learning for Survival Analysis: A New Approach

David Dooling^{1,✉}, Patti Green^{1,‡}, Angela Kim^{1,✉}, Doug Scroggin^{1,‡}, Laura Stevens^{1,‡}, Jennifer Webster^{1,✉}

1 Innovative Oncology Business Solutions, Albuquerque, NM, USA

✉These authors contributed equally to this work.

‡These authors also contributed equally to this work.

*** ddooling@innovativeobs.com**

Abstract

We have applied a little-known data transformation to subsets of the Surveillance, Epidemiology, and End Results (SEER) publically available data of the National Cancer Institute (NCI) to make it suitable input to standard machine learning classifiers. This transformation properly treats the right-censored data in the SEER data and the resulting Random Forest and Multi-Layer Perceptron models predict full survival curves. Treating the 6, 12, and 60 months points of the resulting survival curves as 3 binary classifiers, the 18 resulting classifiers have AUC values ranging from .765 to .885. Further evidence that the models have generalized well from the training data is provided by the extremely high levels of agreement between the random forest and neural network models predictions on the 6, 12, and 60 month binary classifiers.

Author Summary

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Introduction

Opportunities are emerging in many industries today to develop and deploy services that cater to individual needs and preferences. Music aficionados can create their own radio stations tailored to their individual tastes from Pandora¹, bibliophiles can receive highly trustworthy book recommendations from goodreads.com², and Google will provide directions between any two points, giving options such as mode of transportation and as well as warnings of delays in realtime.³ These individualized services share many

¹Pandora Internet Radio - Listen to Free Music You'll Love, <http://www.pandora.com/> (accessed 27 Jan 2016)

²Share Book Recommendations With Your Friends, Join Book Clubs, Answer Trivia, <https://www.goodreads.com/> (accessed 27 Jan 2016)

³Google Maps, <https://goo.gl/1D7Jwf> (accessed 27 Jan 2016)

common features. In particular, they leverage large databases of aggregated information to learn and extract information relevant to individuals. Extracting actionable information from data is changing the fabric of modern business. A class of techniques that transforms data into actionable information goes by the name of Machine Learning [?]. Machine Learning has recently become a popular method to answer questions and solve problems that are too complex to solve via traditional methods.

Materials and Methods

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2. diffuse free particles
3. increment time by dt and go to 1

Results

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Discussion

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Supporting Information

S1 Video

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Acknowledgments

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