T102G

Documentation:
final model reasoning & implementation

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Overview

The final model consists of a corrective model coupled on top of a prediction obtained with Meta's time series predictive model prophet.

The time series data is first detrended and converted into a stationary process to extract a true distribution for the data deviation from the mean. With the different distributions for the different trips, the user has the opportunity to input known a priori information, a tag, meaning what event does the user have knowledge of, and a percentile of impact, an estimate of the impact of the event.

The a priori information is then used to compute the distribution that more closely resembles the day's own and the prediction of raw prediction of prophet is then corrected by the mixture of itself and the probability of demand found with the a priori information.

Reasoning

The model incorporates the a priori information because there are many nuances that a model is not able to reflect, specially when data is labelled. The use of festive/not festive label is for example not useful enough, since there is a strong difference between a municipal festivity and a national holiday, furthermore if the model is rigid and offers no interaction it is not possible to estimate by adapting to unknown social phenomena, like a good weather weekend after a long rainy week, or the popularity of a certain event in a city.

It can be argued that weather is important, but being entirely correlated with the seasons and the months, it does not provide extra information in a predictive model, prophet already incorporates different demands across seasons, and thus it is needed a way to reflect abnormal weather patterns, extremely popular events (for example a Dua Lipa concert in Madrid), or other events that greatly affect demand and that are not reflected in the data in a precise enough way. The way to incorporate this knowledge into a predictive model is by allowing interaction with it, so that the abnormal events can be put in contrast with past similar events.