# PREDICT FUTURE SALE

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#### ABSTRACT

Data mining is a good way to find the relationship between raw data and predict the target we want which is also widely used in different field nowadays. In this project, we implement a lots of technology and method in data mining to predict the sale of an item based on its previous sale. We create a strong model to predict the sales. After evaluating this model, we conclude that this model can be used in normal life for future sale's prediction.

### 1 Introduction

Our project is a competition on Kaggle (Predict Future Sales). We are provided with daily historical sales data (including each products' sale date, block ,shop price and amount). And we will use it to forecast the total amount of each product sold next month. Because of the list of shops and products slightly changes every month. We need to create a robust model that can handle such situations.

# 2 Task description and data construction

We are provided with five datasets from Kaggle: Sales train, Sale test, items, item categories and shops. In the Sales train dataset, it provides the information about the sales' number of an item in a shop within a day. In the Sales test dataset, it provides the shop id and item id which are the items and shops we need to predict. In the other three datasets, we can get the information about item's name and its category, and the shops' name.

**Task modeling.** We approach this task as a regression problem. For every item and shop pair, we need to predict its next month sales(a number).

Construct train and test data. In the Sales train dataset, it only provides the sale within one day, but we need to predict the sale of next month. So we sum the day's sale into month's sale group by item, shop, date(within a month). In the Sales train dataset, it only contains two columns(item id and shop id). Because we need to provide the sales of next month, we add a date column for it, which stand for the date information of next month.

### 2.1 Headings: second level

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$$\xi_{ij}(t) = P(x_t = i, x_{t+1} = j | y, v, w; \theta) = \frac{\alpha_i(t) a_{ij}^{w_t} \beta_j(t+1) b_j^{v_{t+1}}(y_{t+1})}{\sum_{i=1}^{N} \sum_{j=1}^{N} \alpha_i(t) a_{ij}^{w_t} \beta_j(t+1) b_j^{v_{t+1}}(y_{t+1})}$$
(1)

### 2.1.1 Headings: third level

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### 3 Examples of citations, figures, tables, references

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The documentation for natbib may be found at

http://mirrors.ctan.org/macros/latex/contrib/natbib/natnotes.pdf

Of note is the command \citet, which produces citations appropriate for use in inline text. For example,

\citet{hasselmo} investigated\dots

produces

Hasselmo, et al. (1995) investigated...

https://www.ctan.org/pkg/booktabs

# 3.1 Figures

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<sup>&</sup>lt;sup>1</sup>Sample of the first footnote.

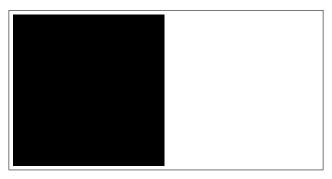


Figure 1: Sample figure caption.

	item_name	item_id	item_category_id
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1	!ABBYY FineReader 12 Professional Edition Full	1	76
2	***В ЛУЧАХ СЛАВЫ (UNV) D	2	40
3	***ГОЛУБАЯ ВОЛНА (Univ) D	3	40
4	***КОРОБКА (СТЕКЛО) D	4	40

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### 3.2 Tables

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#### 3.3 Lists

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- consectetur adipiscing elit.
- Aliquam dignissim blandit est, in dictum tortor gravida eget. In ac rutrum magna.

Table 1: Sample table title

	Part	
Name	Description	Size ( $\mu$ m)
Dendrite Axon Soma	Input terminal Output terminal Cell body	$\sim 100$ $\sim 10$ up to $10^6$

# References

- [1] George Kour and Raid Saabne. Real-time segmentation of on-line handwritten arabic script. In *Frontiers in Handwriting Recognition (ICFHR)*, 2014 14th International Conference on, pages 417–422. IEEE, 2014.
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- [3] Guy Hadash, Einat Kermany, Boaz Carmeli, Ofer Lavi, George Kour, and Alon Jacovi. Estimate and replace: A novel approach to integrating deep neural networks with existing applications. *arXiv preprint arXiv:1804.09028*, 2018.