



Online Product Quantization

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Abstract: Approximate nearest neighbor (ANN) search has achieved great success in many tasks. However, existing popular methods for ANN search, such as hashing and quantization methods, are designed for static databases only. They cannot handle well the database with data distribution evolving dynamically, due to the high computational effort for retraining the model based on the new database. In this paper, we address the problem by developing an online product quantization (online PQ) model and incrementally updating the quantization codebook that accommodates to the incoming streaming data. Moreover, to further alleviate the issue of large scale computation for the online PQ update, we design two budget constraints for the model to update partial PQ codebook instead of all. We derive a loss bound which guarantees the performance of our online PQ model. Furthermore, we develop an online PQ model over a sliding window with both data insertion and deletion supported, to reflect the real-time behavior of the data. The experiments demonstrate that our online PQ model is both time-efficient and effective for ANN search in dynamic large scale databases compared with baseline methods and the idea of partial PQ codebook update further reduces the update cost

Index Terms -Online Shopping, PHP, Product quantization, Admin, User.

I. INTRODUCTION

Product quantization (PQ) is an effective and successful alternative solution for ANN search. PQ partitions the original space into a Cartesian product of low dimensional subspaces and quantizes each subspace into a number of sub-codewords. In this way, PQ is able to produce a large number of codewords with low storage cost and perform ANN search with inexpensive computation. Moreover, it preserves the quantization error and can achieve satisfactory recall performance. Most importantly, unlike hashing-based methods representing each data instance by a hash code, which depends on a set of hash functions, quantization based methods represent each data instance by an index, which associates with a codeword that is in the same vector space with the data instance. However, PQ is a batch mode method which is not designed for the problem of accommodating streaming data in the model. Therefore, to address the problem of handling streaming data for ANN search and tackle the challenge of hash code recomputation, we develop an online PQ approach, which updates the codewords by streaming data without the need to update the indices of the existing data in the reference database, to further alleviate the issue of large scale update computational cost.

II. TECHNOLOGY STACK

3.1 SQL: Structured Query Language is used to perform operations on the records stored in the database such as updating records, deleting records, creating and modifying tables, views [1].

3.2 PHP: The PHP Hypertext Preprocessor is a programming language that allows web developers to create dynamic content that interacts with databases. PHP is basically used for developing web-based software applications. Using PHP, we can restrict users to access some pages in the website [2].

3.4 AJAX: AJAX is an acronym for Asynchronous JavaScript and XML. It can send and receive information in various formats, including JSON, XML, HTML and text files. AJAX's most appealing characteristic is its "asynchronous" nature, which means it can communicate with the server, exchange data, and update the page without having to refresh the page [4].

3.5 JSON: JSON stands for JavaScript Object Notation. It is a lightweight data-interchange format and is easy to read and write than XML. JSON is language independent; it supports array, object, string, number and values [5].

3.6 CSS: CSS stands for Cascading Style Sheet. It is used to describe the presentation of a document written in HTML or XML. CSS describes how elements should be rendered on screen, on paper, in speech, or on other media. It is among the core languages of the open web and is standardized across web browsers according to W3C specifications [6].

3.7 HTML: HTML stands for Hyper Text Markup Language. It is the standard markup language for creating webpages. HTML describes the structure of a web page and it consists of a series of elements. HTML elements tell the browser how to display the content [7].

III. PROPOSED SYSTEM

We developed an Online Shopping portal to explain and support Online Product Quantization.

Hardware setup:

- Processor: Minimum 1GHz. Recommended 2GHz or more.
- Ethernet connection (LAN) or Wi-Fi
- Hard Drive: Minimum 32GB. Recommended 64GB or more, 2GB free disk space
- Memory (RAM): Minimum 4GB
- Operating system: Windows 7 or newer.

Software setup:

- Platform: Windows
- Front End: Bootstrap, CSS, HTML, JavaScript, Ajax, JQuery
- Back End: MySQL, PHP
- Software: Xampp

About System

Dashboard:

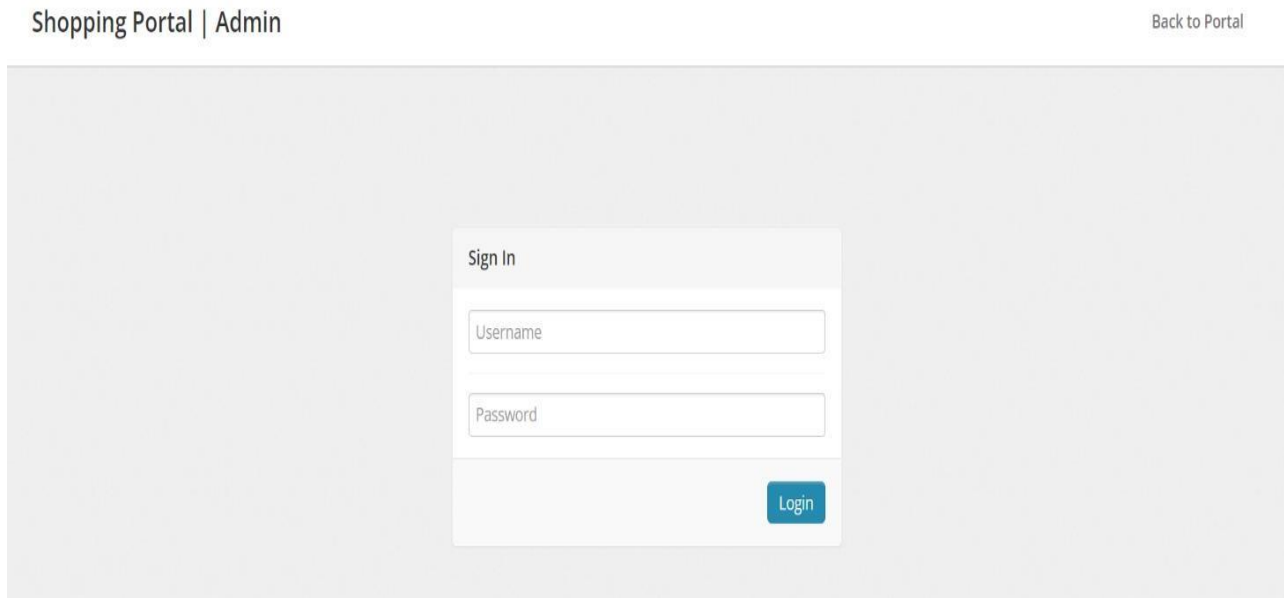
- Admin
 - > Admin Profile
 - > Changes Password
 - > Order Management
 - > Manage Users
 - > Create Category
 - > Sub Category
 - > Inset Product
 - > User Login Logout
- User Area
 - > Create Account
 - > User Profile
 - > Track Order
 - > Add Wish List
 - > Add to Cart
 - > Customer Order
 - > Search Product

IV. RESULTS AND DISCUSSION

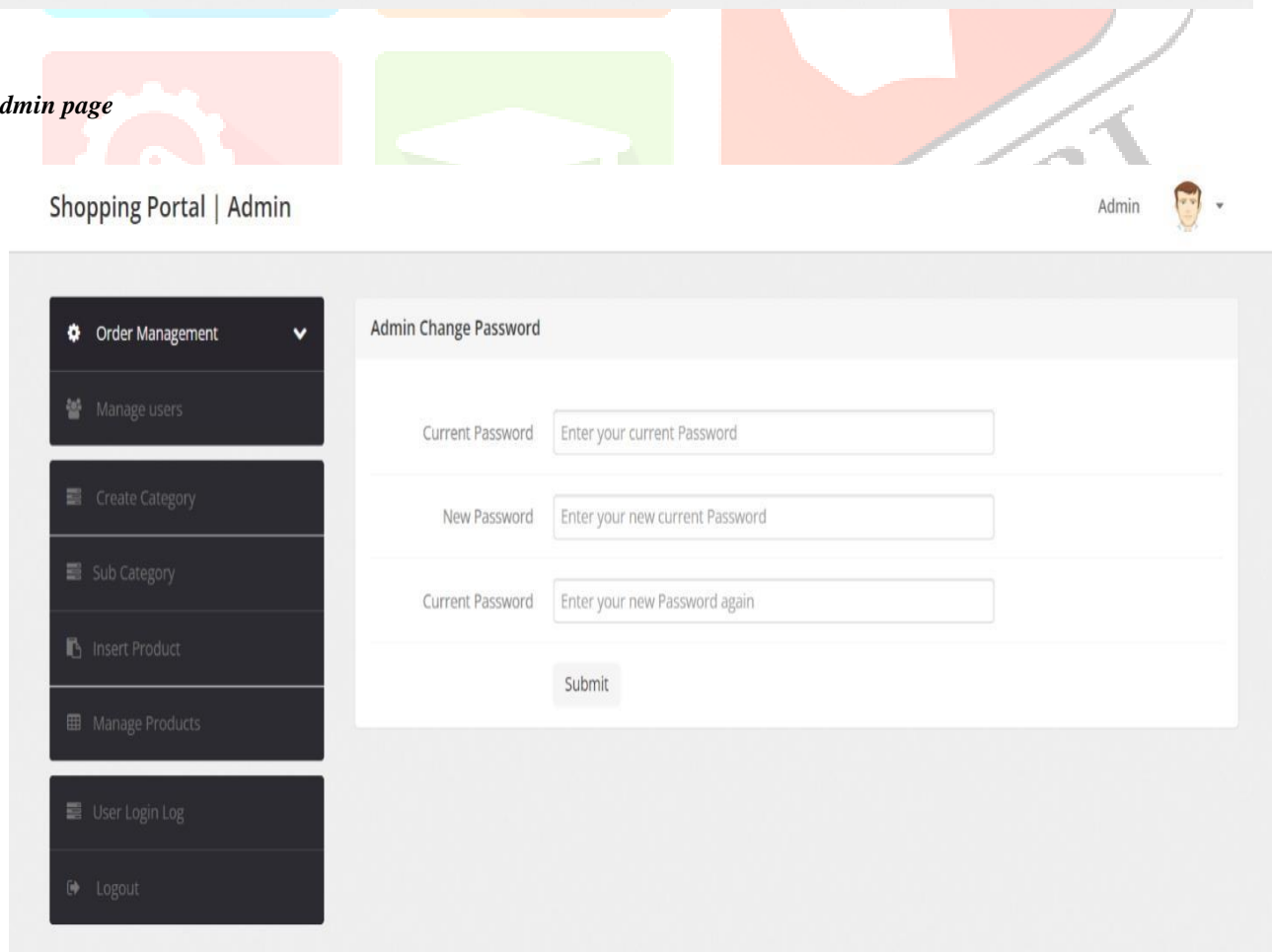
Each time a new data streaming into the system, it moves to the sliding window. We first update the codebook by adding the contributions made by the new data. Correspondingly, the oldest data in the sliding window will be removed. We tackle the issue of data expiry by deleting the contribution to the codebook made by the data point that is just removed from the window. The solution of online PQ over a sliding window to handle insertion and deletion to the codebook.

Admin login

Admin need to enter the user name and password to login into the admin portal.



Admin page



Insert products

Shopping Portal | Admin

Admin 

- Order Management
- Manage users
- Create Category
- Sub Category
- Insert Product
- Manage Products
- User Login Log
- Logout

Insert Product

Category

Sub Category

Product Name

Product Company

Product Price Before Discount

Product Price After Discount(Selling Price)

Product Description

B I U [List Icons] Font Size... Font Familv.
Font Format [List Icons]

Product Shipping Charge

Product Availability

Product Image1 No file chosen

Product Image2 No file chosen

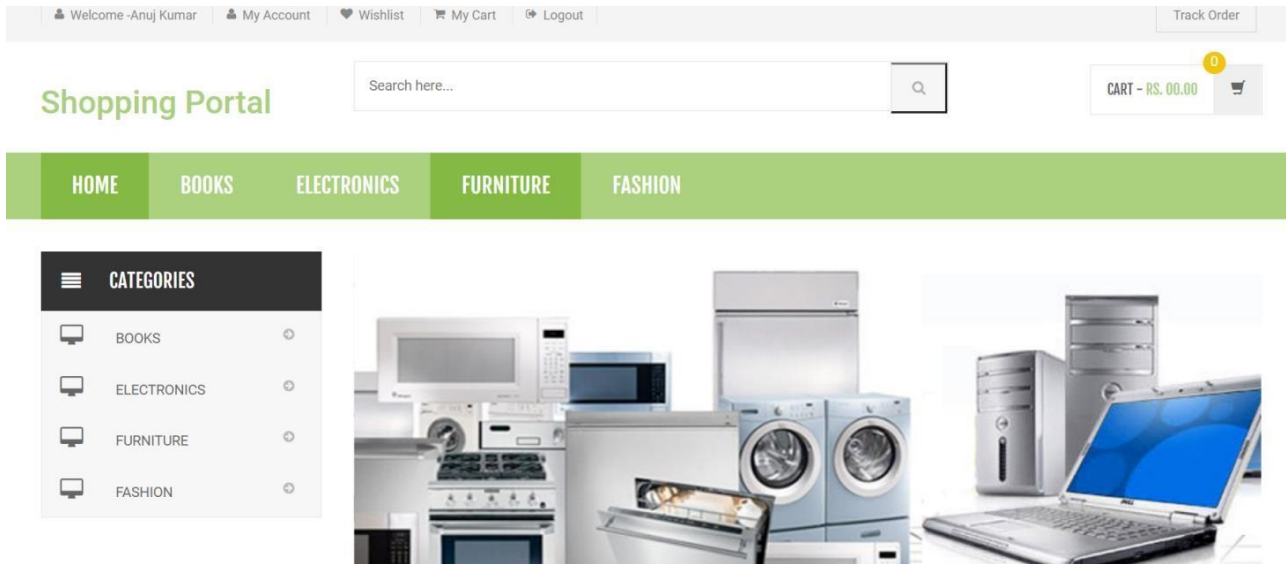
Product Image3 No file chosen

Insert



User portal

This the user portal



IV. CONCLUSION

In this paper, we have presented our online PQ method to accommodate streaming data. In addition, we employ two budget constraints to facilitate partial codebook update to further alleviate the update time cost. A relative loss bound has been derived to guarantee the performance of our model. In addition, we propose an online PQ over sliding window approach, to emphasize on the real-time data. Experimental results show that our method is significantly faster in accommodating the streaming data, outperforms the competing online and batch hashing methods in terms of search accuracy and update time cost, and attains comparable search quality with batch mode PQ.

REFERENCES

- [1] <https://1sourcecodr.blogspot.com/2020/07/online-shopping-system-project-using.html?m=1>
- [2] <https://ieeexplore.ieee.org/document/8320306>
- [3] <https://www.javatpoint.com/sql-tutorial>
- [4] <https://www.tutorialspoint.com/php/index.htm>
- [5] <https://www.javatpoint.com/xampp>
- [6] https://developer.mozilla.org/en-US/docs/Web/Guide/AJAX/Getting_Started
- [7] <https://www.javatpoint.com/json-tutorial>
- [8] <https://developer.mozilla.org/en-US/docs/Web/CSS>
- [9] https://www.w3schools.com/html/html_intro.asp