COMP4801 - Final Year Project

E-poster platform integrated with social networking features

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21st January, 2017
Abstract

This final report presents the current status of the final year project “E-poster platform integrated with social networking features”. The main objective of this project is to enhance the promotion effectiveness of the posters and connect students. Since there are hundreds of bulletin board in campus, it is impossible that students can check out every posters on campus. Building this e-poster platform eliminates this problem as users can access the platform anywhere, anytime with Internet access.

The platform is built in Rails. Rails is a web application framework running on the Ruby programming language, it is a framework with high productivity as its community is open source. There are many different libraries and source code are free to use.

Currently, the development of the e-poster platform almost come to the end, this final report will illustrate the features available now and what can be improved in future.
Acknowledgment

I would like to thank the following people for their help in the production of this project.

Prof. Francis Lau, project supervisor, for his opinions and suggestions. His suggestions give me different insights on how to implement an e-poster platform that will stand out.

Jack Chen, a Web application developer, for his explanation and suggestions on web application framework and web development technology stacks.
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1. Project Background

Bulletin board is intended to post public messages, for example to advertise items, provide information or announce events. In HKU, it is tedious to put up a poster on the bulletin board, there are regulations and policies, also you will have to go to campus and stick it, and remove it after a certain period. Our university organizes hundreds of events everyday, which fills up the bulletin boards on campus. If a students is having lesson in centennial campus, he or she may miss out the posters in other buildings. However, if no one notices the bulletin board, it becomes meaningless and produces a lot of paper waste. E-poster platform can solve the above issues, it does not only eliminate the environmental concerns, it also enhance the management process. More importantly, students can view the posters anywhere, anytime once they can access the Internet.

It is not a secret that today is a generation of social media. A website with posters only is not attractive enough as it only promotes various events or activities. To attract users, the e-poster platform would also integrate some social networking features to connect users and facilitate interactions between users. The platform would also adopt different mechanics to analyze and keep track on the interests and behaviours of users and provide suggestions on activities, events, job opportunities for users accordingly, and even able to suggest potential friends or communities that shared common interests or background with users.

The project is a web-based platform that handles e-poster submissions, schedules them for display according to certain rules and policies, provides and maintains an interface for user interaction.
2. Objectives

- Increase the **promotion effectiveness** of the posters
- Provide a **user-friendly** web-based platform for users to check out posters
- Provide **social networking services** to connect users
- Provide **personalized suggestions** based on users’ interests and behaviours
- Provide a **comprehensive promotion service** for everyone, as the platform is scalable, the user target is not limited in the students of HKU only, all of the university students or even **general public** can also use the platform

The main objectives of the project is to increase the promotion effectiveness of the posters in campus as it is impossible that students will check out every bulletin board in campus. However, to attract students to use it, it has to be user-friendly and attractive. Decent design of layout, social networking features and personalized content would be attractive to students, and there will be different functions and features provided to enhance user-friendliness.

The ultimate goal is to provide a platform for university students to check out posters including different school events, faculty events, society events, entertainment events or even intern and exchange opportunities. It helps students to acquire different event’s information easily. The platform will also integrate social networking features to allow students expand their social circle based on the events, activities, or organization that they participate in.
3. Methodology

3.1 Software development Method

**Incremental model** is used in this project, it generates working software quickly and early during the software life cycle, it is also easy to test and debug. The project work is split into iterations. The platform is incrementally enhanced with additional functions or features in every iteration. The development cycle is as the figure below.

![Development Cycle Diagram](image)

*Fig 3.1*

This project is suitable to use incremental development model as I can get the feedback from my supervisor and users and make changes regarding to the feedbacks immediately to optimize future iterations.
3.2 Framework and Technologies

Ruby on Rails is used to build core features of the e-poster platform. It is a web application framework with MVC architecture. MVC stands for model, view, and controller respectively. The controller response differently according to user's action, it decide what is going to happen based on user's action. It then will communicate with model to get the data needed from database. When it decided what is going to display on the browser, it will then send the html,css, javascript to the view, the presentation layer. The following figure is the concept of MVC architecture in user’s perspective.

![MVC Architecture](image)

Ruby on Rails is very suitable in this project as it is very productive comparing to other framework as it has a object-oriented nature and vast collection of “gem” available online. “Gem” is the software package of Ruby which contains a packaged Ruby application or library. It can be used to extend or modify functionality in Ruby applications. There are around 9000 gems available on the Internet, so it
saves up a lot of time for building function from nothing and thus speed up the development process.

Bootstrap is a front end framework for easier and faster web development. It provides a lot of user interface components like buttons, forms, tables, navigation bars, dropdowns, modals...etc. The figure below is a group of UI components of bootstrap.

Fig 3.3

It also helps to create responsive layout with much less efforts with its “grid” design by calling classes. The figure below is one of the example using the “grid” classes. The webpage will display responsively according to different resolution.

**Example: Stacked-to-horizontal**

Using a single set of .col-md-* grid classes, you can create a basic grid system that starts out stacked on mobile devices and tablet devices (the extra small to small range) before becoming horizontal on desktop (medium) devices. Place grid columns in any .row.

Fig 3.4
4. Design and Features

4.1 User Model

Basic login function has been implemented. User have to register their account with their email to verify. It is useful when user forgot their password of this platform. When user logged in, he or she can apply to the event associated with the poster.

![Login Form](image)

Fig 4.1.1

The above figure is the login form of the platform. When user click the “Forgot your password” button, a hyperlink will be sent to user’s email. User can reset the password by click the hyperlink.

The login function is created using a rails software package called “devise”. It provides flexible authentication solution. It interacts with the user model to authenticate user on the database, and it also supports different extension software package like “OmniAuth”, which allows rails
application to authenticate with multiple provider like facebook, twitter, github...etc.

When user click the “Sign in with Google button”, user will be redirect to google’s authenticate panel. If user’s google account is authenticated. The account information like email, name will automatically store in the database.

Fig 4.1.2

Fig 4.1.3 shows the message from the e-poster platform when user is authenticated successfully from Google.

Fig 4.1.3
When user is signed in, user can click “Account” button on the navigation bar to edit the account information. Fig 4.1.4 shows the form for users to edit their account details. Currently, users can only edit their name or password.
4.2 Poster model

Poster model have been created. Poster can be view, upload, edit and delete. Poster and its information will be stored in the database when user upload the poster. Also, the owner of the poster is able to edit and delete it. Every user can view the posters on the home page. It supports 3 kinds of extension, jpg, png and pdf.

When user is signed in, user can click the “New Poster” button to upload poster. The above figure is the form for user to upload the image the posters, and to fill in the information about the poster.
The above figure is the home page of the e-poster platform. It will divide posters into 3 sections, “Suggested for you”, “Most Popular” and “Most Recent”.

“Suggested for you” will be displayed only if the user is signed in and he or she liked other posters before. The mechanism behind “Suggested for you” is using Jaccard Index, also known as Intersection over Union and the Jaccard similarity coefficient to compute the similarity between posters. Posters are associated with users through likes. Two posters are similar if they are liked by many of the same users.
The above formula is the Jaccard similarity coefficient. It is a statistic used for comparing the similarity and diversity of sample sets. The Jaccard coefficient measures similarity between finite sample sets, and is defined as the size of the intersection divided by the size of the union of the sample sets:

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|}$$

When it applies to the poster model of the e-poster platform, suppose user 1 and user 2 also liked Poster A and Poster B, then their Jaccard similarity coefficient is 1(largest value) as they get exactly the same number of likes.

“Most Popular” and “Most recent” posters represent the posters that has the most likes and uploaded most recently respectively.
When user click the poster, the platform will redirect to a “show” page that allows user to view the details of the poster and perform action to the poster. The figure above is the show page of a poster. User can view the description, comments and related poster on the “show” page. They can like, comment and bookmark it.

The figure shows the message after user bookmarked a poster, also the “Bookmark” button will become “Unbookmark”
In order to provide a “All in one” portal, the e-poster platform will get the interns from the official CEDARS website, and thus students can acquire activities, events and intern opportunities in a single platform. The figure above is the intern page, when user click the view details button, it will redirect user to another page, the page will show the details or will show the application page of the intern.
5. Difficulties encountered

5.1 Compatibility

There are two main difficulties I have encountered. The first one is compatibility. Since incremental model is used, new functions will be implemented after each milestone. When I am trying to add new functions, I will have to consider to make the existing platform and new functions compatible. For example, when I try to make posters associated with different category, the poster model should add an attribute to store which category it belongs to.

5.2 Styling

The second problem I have encountered is about styling. Styling is one of the most important thing to attract users. Since I used Ruby on Rails as the backend of my platform, it uses rails application template like erb and haml, it is quite different from html code. So it takes time to style the webpage using these templates. The following figure shows the difference between Haml and HTML.

---

**Haml vs HTML**

```haml
%html { html_attrs }
  %head
    %title Haml syntax demo
  %body
    %content
      %h1 Haml should be:
        %ul
          %li Beautiful
          %li DRY
          %li Well-indented
      %h1 Clearly XHTML
    %footer
      %span.author Ciaran
```

```html
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html lang="en" xml:lang="en-US">
  <head>
    <title>Haml syntax demo</title>
  </head>
  <body id="content">
    <h1>Haml should be:</h1>
    <ul class="principles">
      <li>Beautiful</li>
      <li>DRY</li>
      <li>Well-indented</li>
    </ul>
    <h1>Clearly XHTML</h1>
  </body>
</html>
```

---

Fig 5.1
5.3 Facebook login API

The third problem is about “login with facebook”. Function and callback is configured, but it is unavailable yet as Facebook limits all of the API calls from http, it requires https connection from the newest update.

![Error](image.jpg)

**Fig 5.2**

The above figure shows the message of getting API request from http connection.

Last problem is about the payment gateway. In the beginning, I wanted to provide payment gateway for the posters. For example, if the poster is promoting an event that cost money, students do not have to go to campus to pay in person, they can just pay it online. However, I found this approach is not applicable, because each of the organizer has to setup an account from the Payment service provider.
6. Future Plan

6.1 Design and Layout

Since there are many different features have to be implemented, I do not have much time to deal with the layout and styling of the e-poster platform. It looks simple and clean but it is not very attractive. In the future, I hope to make it looks more attractive. Currently, I am using only jquery, css libraries like bootstrap to layout the platform. However, it is not the best approach in the modern web development. React JS is a front-end framework that allows keep tracking the state of an element. In this case, it can track the state of the poster whether being liked or not. It performs better and easier in this aspect. So, in the future I would probably integrate React in my platform.

6.2 Personalization

Personalize the content for each individual user enhance the user experience. The platform will recommend posters to each individual user according to their previous actions, behaviors or their backgrounds. For example, if the user likes the poster related to outdoor activities, then the platform will recommend hiking event poster, surfing event poster...etc. Currently, I am using Jaccard Index to compute the similarity of posters through users’ likes. But there are better ways to do it, like using more complex recommender system. Due to the limit of time, I do not have much time to investigate complex recommenders. In the future I will integrate some better option for suggested friends and posters in the platform.

6.3 Social networking features

Friendship model has been implemented, users can send friend request to other users. But the add on features of friendship is not implemented yet. Showing activity of friends and Inbox /
messenger functions will also be added in the future to enhance the interactions between users.

<table>
<thead>
<tr>
<th>Date</th>
<th>Accomplishments</th>
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<tbody>
<tr>
<td>December 2017</td>
<td>Design Database schema, Implement the <strong>core features</strong></td>
</tr>
<tr>
<td></td>
<td>➔ Login function</td>
</tr>
<tr>
<td></td>
<td>➔ Categorizing posters</td>
</tr>
<tr>
<td></td>
<td>➔ Able to <strong>upload, edit, view and delete</strong> posters</td>
</tr>
<tr>
<td>Late January 2018</td>
<td>Implement <strong>add-on features</strong> to enhance <strong>user friendliness</strong></td>
</tr>
<tr>
<td></td>
<td>➔ Storing poster for easy retrieval</td>
</tr>
<tr>
<td></td>
<td>➔ Sorting poster by different parameters</td>
</tr>
<tr>
<td></td>
<td>➔ Searching poster by different parameters</td>
</tr>
<tr>
<td>March 2018</td>
<td>Implement the <strong>social networking features</strong></td>
</tr>
<tr>
<td></td>
<td>➔ Able to <strong>login</strong> with Facebook / Google</td>
</tr>
<tr>
<td></td>
<td>➔ <strong>Comments / Likes</strong> on posters</td>
</tr>
<tr>
<td>April 2018</td>
<td>Implement the <strong>social networking features</strong></td>
</tr>
<tr>
<td></td>
<td>➔ <strong>Personalization</strong> for users who logged in like <strong>suggestions</strong> on friends,</td>
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<td></td>
<td>posters, events</td>
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<tr>
<td></td>
<td>➔ <strong>Exploring</strong> new friends</td>
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<tr>
<td></td>
<td>➔ <strong>Inbox / Messenger</strong></td>
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The above table is the schedule of my project. Most of the features has been implemented. Friends’ activity and messenger function is still in progress and not completed at the time of handing in this report.

**7. Conclusion**

To conclude, all of the basic features are implemented. Students can find out events, activities and intern opportunities very easily. However, there are still rooms for improvement. Providing friends’ activity and messenger function can further connect users. I will keep developing to provide a user-friendly platform to connect students and help them to have a more fruitful university life.
8. Reference


