

**SNA4SLACK**

# Course Project Final Report

CS304 Object Oriented Design

Team Member:

谢宜 11510074  
冷玥 11510213  
方一栋 11510493  
阎相易 11510706  
谢丹宁 11510718

## **I. Motivation**

Slack is a collaboration tool now adopted by many software developers for intra-team messaging, sharing files, and aggregating communication from different tools. Slack messages posted to a public channel are visible to the entire team. Users will get notified if one subscribes to the channel or one is mentioned (@username).

However, when a slack channel gets crowded, it's pretty hard for a user in the group to get well known of the relationships between each other.

In this project, we will develop a web application that allows users to analyze and visualize social networks built upon Slack conversations. We will make Slack a better tool for user groups.

## **II. User Benefits**

For users like new comers of teams, leaders of groups or sociology researchers who have the need to find out and analyze the relationship between group members, our project allows them to get the results they want with simple operations. In this application, users only need to search for a slack group and the app will visualize the relationships within the group and each channel, which can also be filtered by timeline. The social networks we generated allow users to gain a greater and intuitive understanding of the relationship. Users can also select specific user's details or multi-user relationships.

## **III. Features and Requirements**

### **1. Requirements**

- The web application allow users to visualize and analyze social networks built upon Slack conversations within public channels.
- Visualizations should provide a way to show the network graph, without node overlapping, using one or more layout algorithms.
- The system might allow the user to set filters for pruning the graph by keeping only nodes and edges that satisfies filters conditions.
- The system should provide the most common metrics for social network analysis (SNA), including metrics to assess the overall structure of the network

### **2. Features**

#### **i. Social networks and Network graphs**



Fig.1 Social Network

We established mention-based social networks in which Slack's team members are considered as nodes and edges' length represents number of mentions (@username). The shorter the edge between two nodes, the more they mentioned each other, the closer relationship two team members have. The network graphs as shown in Fig.1 are explored through visualization and analyzed to allow users to gain a greater understanding of the network.

Users can also save the graph as Scalable Vector Graphics(svg) in a .svg file.

## ii. Channel Analysis

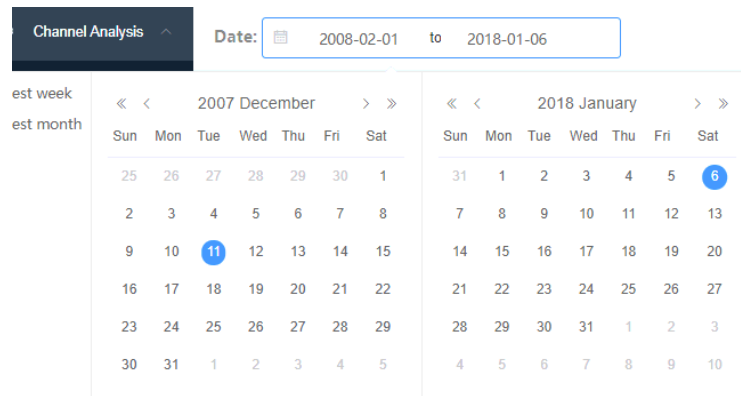


Fig.2 Timeslot Panel

Our application can analyze social relationship within a group or channel and allow users to filter messages through timeline. The application can visualize a social network of selected channels within selected time range. User can select timeslot in a panel shown in Fig.2.



Fig.3 Channel Information Statistics

To help users have a general knowledge of the channel, our application gives four tags on the bottom of the channel analysis page as shown in Fig.3. Accounts shows the number of slack users in this channel; Messages indicates the number of total messages in the channel; Relations means the number of mentions in this channel and Created gives the creating date of this channel. Also, these channel information tags will change through the timeline.

### iii. User Analysis

Our product provides analysis of single user and multiple users.

#### a) Single User Analysis

The application calculates the following indicators of the selected user:

- **Activity Degree** : mainly used to describe the number of user statements
- **Emotional Analysis** : A larger indicator indicates the user's comments are mostly positive, and vice versa more negative.
- **Joined Days** : days that the user has joined the group

#### b) Multi-user Analysis

The following indicators are provided when analyzing relationship between two users:

- **Intimate Degree** : This indicates the intimacy between two users and is calculated mainly based on the frequency of mentions.
- **Emotional Analysis** : The greater the indecator, the more emotionally positive the content of the conversation between the two individuals.
- **Meet Days** : Days since the first time these two people talked on Slack.

### iv. Word Cloud



## v. User Rank



## VI Design

Our project divides the application into two parts: frontend and backend. For the front end, it mainly focuses on the User Interface and the Display of the SNA data. For the backend, the responsibility is to give the service of Web API. The backend consists of Java programs and a MySQL database. Also, there is a python program for deep analysis.

We use the technique of Vue.js and Webpack for frontend development. Vue is a progressive framework for building user interfaces. It is convenient because Vue is

designed from the ground up to be incrementally adoptable. The core library is focused on the view layer only, and it is easy for us to pick up and integrate with other libraries or existing projects.

We designed many components for the web UI and then combined them in a very convenient manner. The process of development is under a continuous integration process which reduces the time between development and the deployment.

### 3. Back End

Java Spring Boot is used as main server. Python Flask is used to analyze data. QCloud API is used to provide advanced analysis like emotion. On the server, data is crawled from SlackArchive on a regular basis. All the data is stored in relational database. A set of API interfaces is provided to grab data from database as well as do analysis on it. To make deployment easy, both spring boot server and compiled front end resources are packed into a single jar file. Reverse proxy is also included to provide access to python API.

## V User Interface

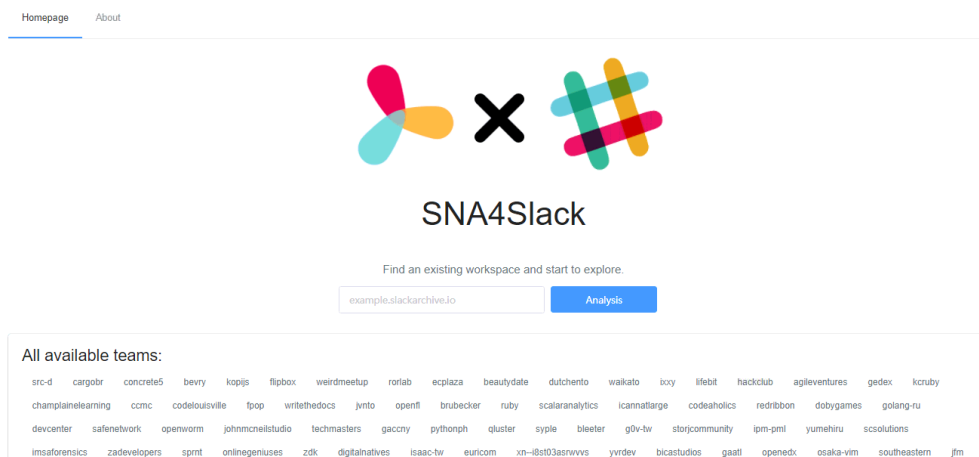


Fig.6 Homepage

In our homepage (Fig.6), all available teams for analysis are listed below. User can select one of them and input into the search bar.

Layout is the outermost structure for a project, consists of navigation, sidebar, breadcrumb and content.

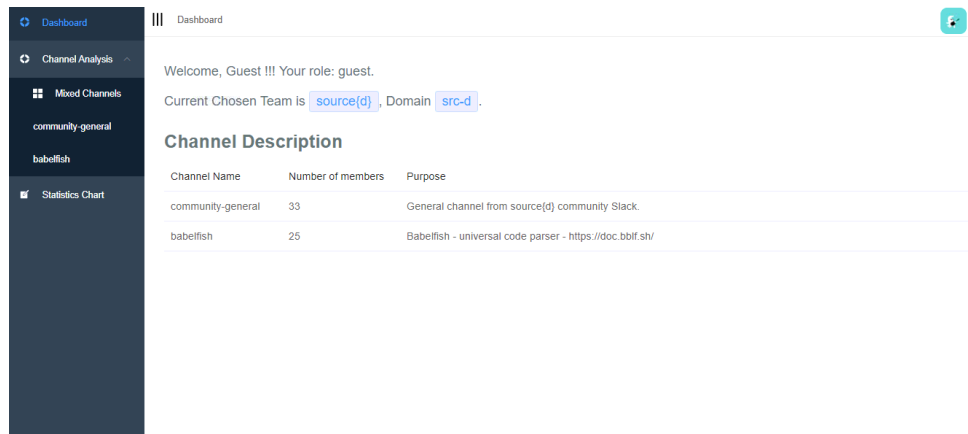


Fig.7 Dashboard

The dashboard(Fig.7) shows the basic information of the team and a table of channel description including name, number of members and topic of each channel.

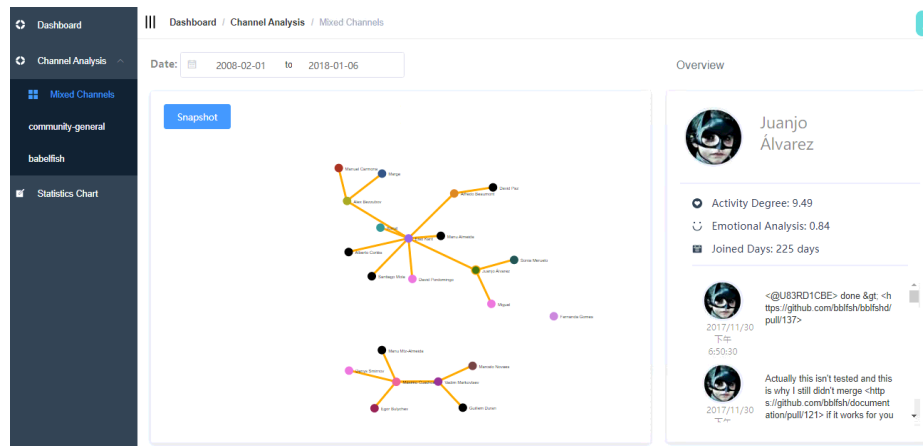


Fig.8.1 Channel Analysis : Single User

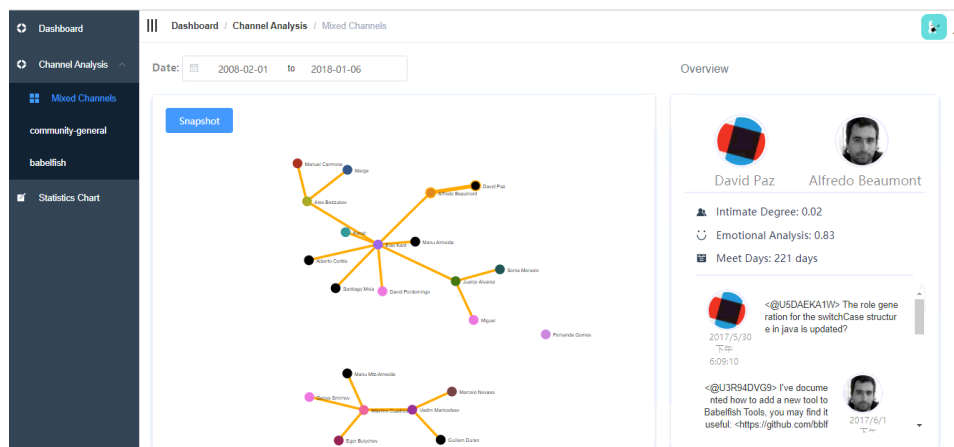


Fig.8.2 Channel Analysis : Multi-User

In the Channel Analysis module, user can see the social network diagram of either mixed channels(all channels) or selected channel.

Users can select a node by simply clicking on a node to see the details revolving to the certain member as Fig.8.1. The edge of the graph can also be selected as shown in Fig.8.2 to visualize the details between two members.

Users can click on the “Snapshot” button to store the graph into a .svg file.

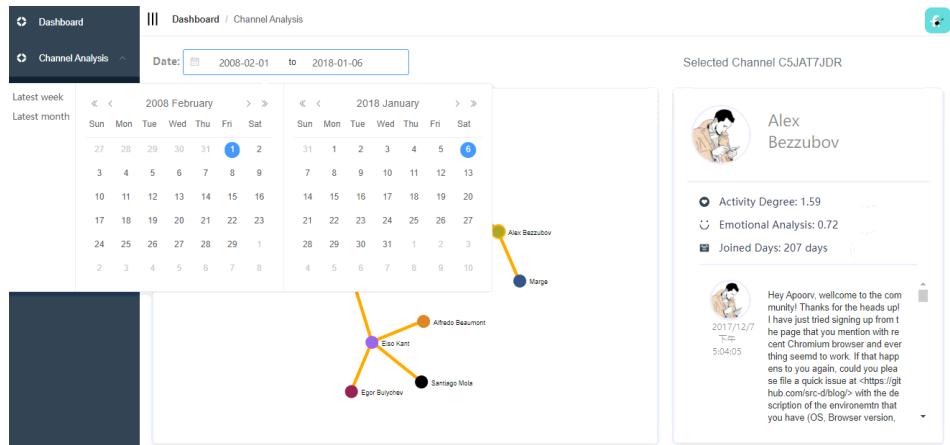


Fig.9 Timeslot selection

User can select timeslot on the timeslot panel shown in Fig.9 for filter conditions..

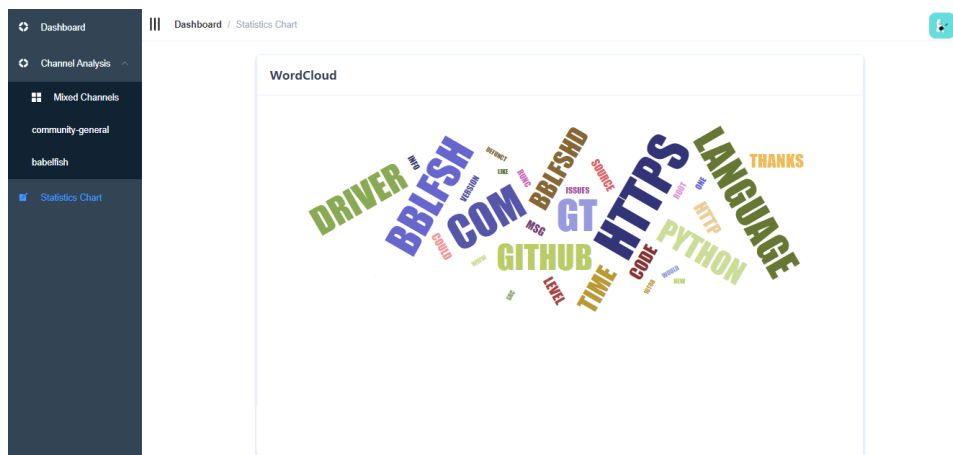


Fig.10 Statistic Chart Module

Word cloud and user rank block can be found in the Statistic Chart module in Fig.10.