







user interface. In addition, the user interface should be parameterized, interactive, and exploratory. Because of mobile devices screens have limited space available to user interfaces, solutions like pull-to-refresh and sliding-side-menu are used to create a better user experience.

The client application is developed for the three major platforms: Android, iOS, and Windows. The main page<sup>3</sup> or the news feed, as shown in the left part of the Figure 3, is the first view that is loaded and is the root navigation point. From here, it is possible to navigate to all the other views such as full view for a single article, map view for a single article, and map view of recommended articles. The set of recommended articles is presented in a scrollable view in the main page, while each article is represented by one square, or tile. Each tile has a title, lead text, and a background color to represent the category of the news article. Every three seconds a random tile among the articles is flipped horizontally and the news article's image is shown for a short period of time. It is also possible to do a pull-to-refresh gesture to refresh the news feed and display the latest news. The user can set the preferred category of news articles in the profile using the Filter menu and can send location information to the server using the Location menu. A map of recommended articles can also be shown, see the right part of Figure 3. A clickable dialog box on each article's pin on the map moves the screen to the full view of the corresponding article.

The space limitations of mobile devices is overcome by (i) presenting the information to the user in three levels of granularity: main page view, RSS view, and the whole article view, (ii) replacing the use of buttons and other space-occupying UI features with gestures (*e.g.*, swiping, double tap, holding down one finger, ...) and metaphors from traditional paper-based newsletters (*e.g.*, a paper metaphor in the sense that it looks like turning a page when the user moves from one RSS story to another or a page-folding effect when the user goes to the settings page) to make our gesture-based interface more intuitive, (iii) showing only the relevant information at a given time (*e.g.*, the whole article and the map are shown on separate views). These features can be counted as novel parts of our system as well.

The main properties of the user interface design are user control, parameterized design, exploratory, and interactivity. The user is able to interactively and directly modify time, location, and other parameters such as news source, topics, and news categories and have the system respond immediately with updated views of relevant news. Furthermore, the system supports source tracking by allowing users to go from any news summaries to the original news articles.

### 3.2.2 Detection of the User's Desirability

The goal of the recommender system is to choose a subset of articles that maximizes the user's utility; that is the user's *desirability* for the articles. It is important to consider a broad array of complementary implicit indicators of the users' interests, which can effectively leverage the weak explicit signals about the user's desirability. We considered both "pre-read" user actions such as clicking on the news article and "post-read" engagement signals like discarding, favoriting, sharing, commenting, and e-mailing article links as indicators of the user's desirability. These techniques con-

<sup>3</sup>The video demonstration is available at <http://youtu.be/3HgvnlqZ67A>.

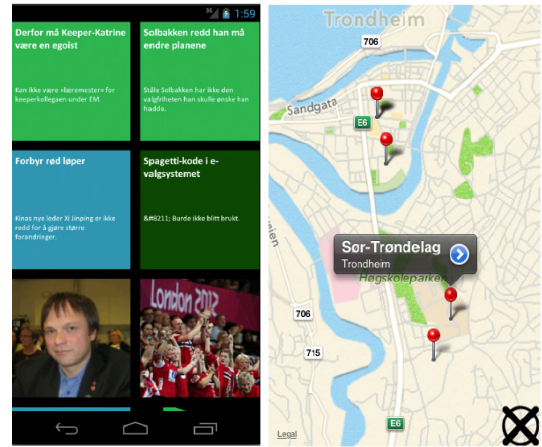


Figure 3: Two parts of the user interface.

trusted with the majority of existing solutions that only use the observed click-through rate as the primary indicator of a user's engagement.

## 4. CONCLUSIONS AND FUTURE WORK

Personalized news article recommendation is not only important to solve the information overload and attention scarcity problem, but also is important to improve users engagement on news sites. This demo paper presents the development of a personalized mobile news recommender system.

As the future work, we will add extensions with event and entity news views. Basically, there will be screens supporting the list of most prominent entities and events for the recent news articles as well as graphs of popularity and sentiments over a period of time for each entity and event. The idea is that the user will be able to switch between news stories, events and entities to drill down to his/her relevant news article without entering any search query or having to go through many clicks. Moreover, we plan for both online evaluation (using real users' opinions and editorial judgments from journalists) and offline evaluation (comparison with a baseline approach using popular information retrieval metrics) of our system.

## 5. REFERENCES

- [1] I. Cantador and P. Castells. Semantic contextualisation in a news recommender system. In *the Workshop on Context-Aware Recommender Systems (CARS)*, 2009.
- [2] A. S. Das, M. Datar, A. Garg, and S. Rajaram. Google news personalization: scalable online collaborative filtering. In *the 16th international conference on World Wide Web (WWW)*, 2007.
- [3] G. De Francisci Morales, A. Gionis, and C. Lucchese. From chatter to headlines: harnessing the real-time web for personalized news recommendation. In *the fifth ACM international conference on Web search and data mining (WSDM)*, 2012.
- [4] Y. Lv et al. Learning to model relatedness for news recommendation. In *the 20th international conference on World Wide Web (WWW)*, 2011.
- [5] Sh. O'Banion, L. Birnbaum, and K. Hammond. Social media-driven news personalization. In *the 4th ACM RecSys Workshop on Recommender systems and the Social Web (RSSW)*, 2012.
- [6] X. Shuai, X. Liu, and J. Bollen. Improving news ranking by community tweets. In *the 21st International Conference Companion on World Wide Web (WWW)*, 2012.