



# Men are from Mars, Women are from Venus ! (Gender-based feature analysis in Campus-wide WLANs)

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## Introduction

- “Men are from Mars and Women are from Venus”...does this statement apply to wireless usage as well? This is the motivation of our research and the focus of this poster.

-We present a novel technique to classify users into groups based on their behavior/usage of WLAN into *gender, major, or interest groups*.

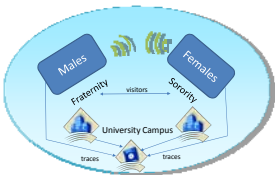
- Gender gaps in WLAN usage are investigated across a major University campus\*\* and the wide impact of such a study (possibly in the social sciences and profiling) is highlighted. Rarity of empirical data about gender based user profiles, makes our study interesting.

## Methodology

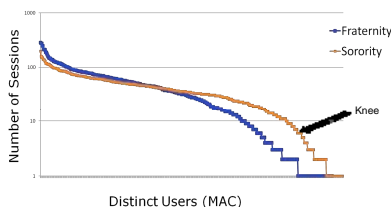
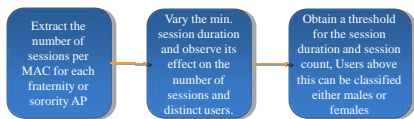
-WLAN trace data provides information about

-WLAN trace data provides information about associations of MAC addresses with access points (APs)

-APs we can track mobility of a user as s/he logs on to different APs on campus. Consider the technique below:



- Visitors are infrequent users, their associated number of sessions is, in general, less than that of regular users. These visitors are excluded for improved accuracy:



Notice the “knee” bend feature in both the curves, this gives an indication of the visitors to these organizations

- 452 (out of 777) MACs associated with fraternities and 463 (out of 687) MACs associated with sororities are classified as regular users. These users are considered for further analysis.

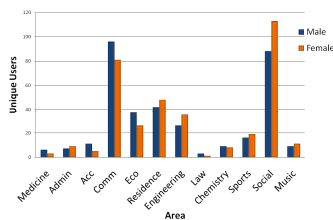
-All the AP locales these users frequent were accessible for our study

## Challenges

- Determining the building locations of the APs from the WLAN traces. This had to be done manually on a campus map.
- Establishing threshold values for filtering out male and female users
- Doing similar analysis across different campuses will be challenging
- Getting statistically significant results

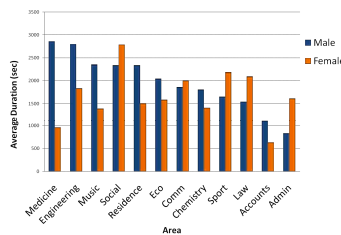
## Results

- WLAN Usage and Gender Distribution: What are the trends in WLAN usage across different (buildings) areas on campus?



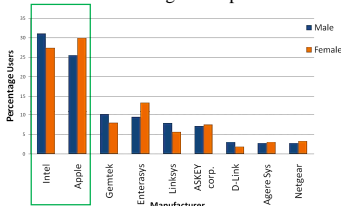
Note: *Communications/Journalism (Comm) buildings show a higher population of male users, social science buildings have a higher count of female users (intuitive). It is interesting to see that there are more female WLAN users than males in Engineering buildings, this is a non-intuitive observation*

- Average session duration: are there trends in the average online times of users and can differences be spotted based on gender and (building) areas within the campus?



Note: *In general, Males spend more time online than females in most of the areas. Females show dominant usage in the Social Science and Law areas across campus. We can deduce from this that on average, male users tend to stay - as WLAN users - at certain places for longer times than females.*

- Manufacturer preferences: Which device vendors do different genders prefer?



Note: *For this study, only major vendors were considered (based on the type of wireless card traced). A similar analysis was done for different time periods to show time evolution and consistent trends (with the above 30-day trace analysis) were observed.*

It is interesting to note that *Apple* computers are more popular amongst *females* than males. *Intel* devices are more popular amongst males

- For males there are ~25% using *Apple* and ~32% using *Intel*, so there are 7/25=28% more male users using *Intel* wrt *Apple* users
- For females: there are ~30 % using *Apple* and ~27% using *Intel*, so 3/27 =12% more females users using *Apple* wrt. *Intel* users
- We can say there is a relationship between gender and brand with 90% confidence.
  - Using a null hypothesis *'there's no relationship between gender and preference of Apple Vs Intel'*

## Applications

- Profiling: Such kind of techniques in general can be used to profile a user.
- Social Science: The extent of WLAN adoption amongst genders is obtained and can point out socio-economic and socio-cultural differences between genders.
- Advertising: Trends in mobile social networking for these groups can be used to provide services. Announcements and advertisements on campus can be directed based on the general psyche of males and females. The areas these users frequent more could serve as good places to advertise related interests, services or products.
- Application Customization: Based on vendors different genders prefer.

## Conclusions

- Study is unique and a database approach proves to be very flexible and convenient to extract features of interest from WLAN traces.
- We find some non-intuitive observations contrary to conventional beliefs regarding gender-bias in WLAN usage.
- Wide impact to social networks if study is extended across various campuses (an ongoing work). We hope for this study to open the door for other mobile social networking studies and profile-based service designs.

## Future work

- Extend this kind of technique to group users based on Majors and interests groups. This could also encompass a detailed time based analysis of gender mobility based on different time periods of the day (morning, afternoon, evening hours).
- Investigate traces from multiple campuses.

## Acknowledgments

Special mention to Imran Hassan and Vaishnav Kidambi who were in a class project of which this research is an extension.

\*\* We use a 30- day long WLAN trace collected from a major University campus; 12 fraternities and 7 sororities on campus were considered for this study.

