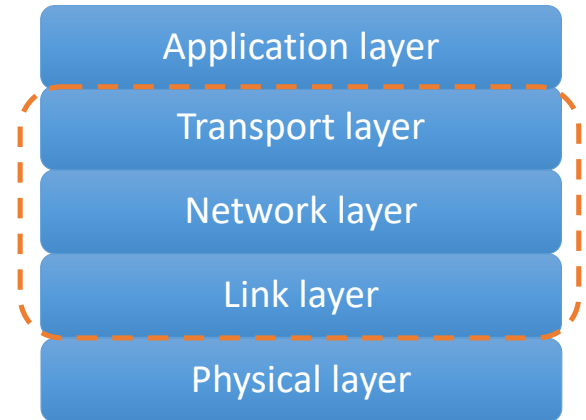


Under-graduate Project

許裕彬

My research

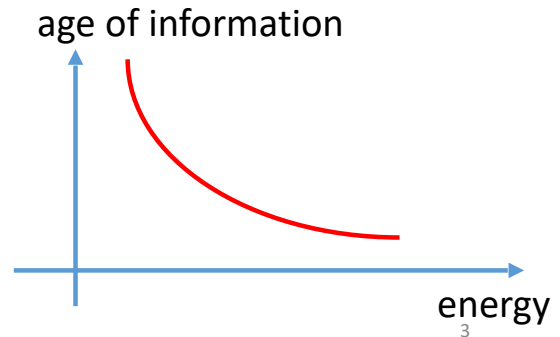
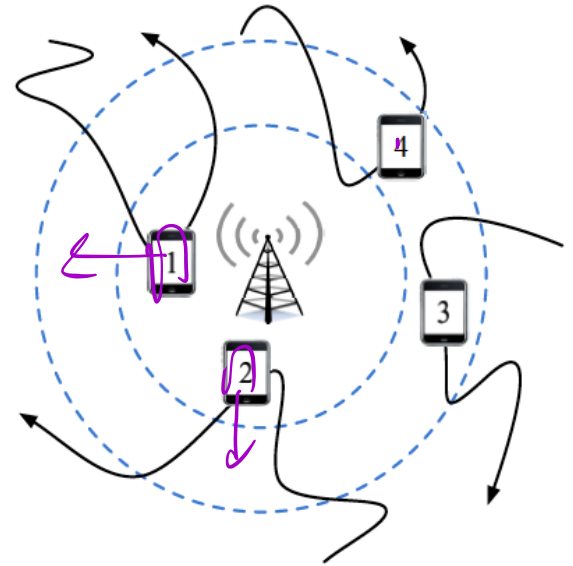
- **My** research center around networked systems, e.g., communication networks.
 - Analysis and design.
 - Identify theoretical limits, e.g., throughput, delay, etc.
 - Develop efficient schemes that can be mathematically proven to attain (or approximate) the limits.
- **No** implementations!
- Look at my website at <https://sites.google.com/site/yupinhsutw/> for details.





An example of my research

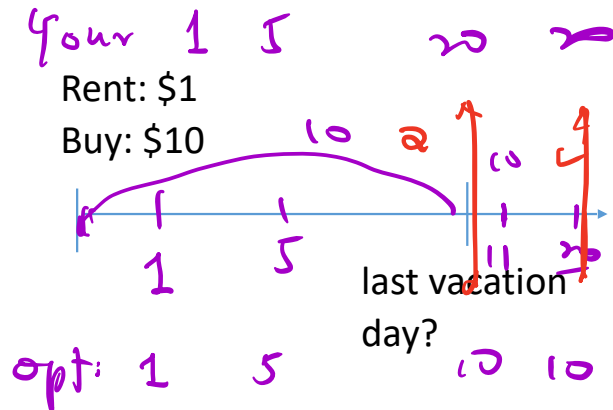
- Consider a base-station (BS) and multiple **moving** users.
- Those users are running some applications that need **fresh** information, e.g., traffic.
- **Problem:** develop a scheduling algorithm for the BS to determine when to send an information update.
- **Goal:** minimize the age of information with the minimum energy consumption.
- **Challenge:** all users are moving at will (following **no** probability distribution) and thus the BS has no idea about where those users will go.



A hope to the problem

- validate
1. implementation
 2. simulations
 3. math

- Ski or rental with **no** idea about the last vacation day?
- **A simple algorithm:** rent for the first 10 days and buy at the 11-th day.
- The optimal algorithm (that knows the last vacation day) is
 - if the vacation lasts for no more than 10 days, rent;
 - if the vacation lasts for more than 10 days, buy.
- What is the performance of the simple algorithm? No matter when the last vacation day is, the cost incurred by the algorithm is **at most twice** of that incurred by the optimal algorithm!
- There exists a better algorithm that can achieve the ratio of 1.58!

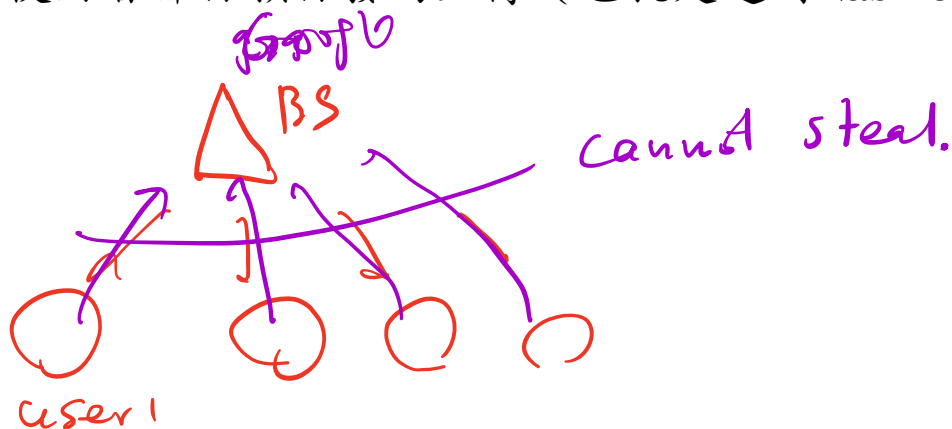


Your projects

- Research is to explore unknown.
- Explore your **interests**, because your pressure is much less than graduate students'.
- Do something that interests you, but not work for me:
 - After some reading, bring your own ideas (related to my area) and then we work together to solve your problem.
 - Pick one problem from my list.
- You can validate your solutions by either math or simulations.
 - No implementation!
-

Example 1: 郭泰榕，陳宥丞，游智翔

- 許：我最近做資訊更新…。
- 郭陳游：我們這學期去經濟系修賽局理論，賽局理論可以結合資訊更新嗎？
- 我：好像很有趣，你們回去想一下Google map這個例子。
- 郭陳游：我們想做分散式資料隨機上傳更新，看看是不是何以讓每個使用者都自願自發的上傳（也就是達到Nash equilibrium.）



Example 2: 王緯晴，林佩瑩 google

- 許：我最近在看bandit problems...
- 王林：那可以用在推薦系統嗎？
- 許：可以，但有人做過了！
- 王林：那同時推薦產品跟自動標價嗎？
- 許：蠻有趣的，好像沒人做過。
- 王林：那這個問題可以應用在通訊上嗎？
- 許：好像可以，你們看一下mobile edge computing
- 王林：我們想利用bandit來解決mobile edge computing裡，如何決定下載的程式以及其標價，以達到基地台利益最大化。

