LINDEN LAB: Recommendation engine for Second Life

What is Second Life?
A virtual world with regions that are populated by avatars.
- Linden Lab makes platform for object creation and scripting, and hosts the land and space servers.
- Content is all user-made.
Region vary from well-constructed and populated to mostly abandoned and devoid of aesthetic quality.

Second Life Activities
- Chat with IMs or voice
- Fly and teleport
- Own land on which to build
- Build and script objects
- Buy or sell user-made virtual goods with Linden Dollars (LS)
- Clubbing
- Concerts
- Dating
- Roleplaying

Problem
After the novelty of flying and having an avatar wears off, it is difficult to find engaging places.
- Currently, Linden Lab offers a showcase of hand-selected places.
- Search functionality is improving, but not great.
- Avatars may promote "picks" on their user profiles.
- In-world maps show current avatar locations, but it is slow.

Our Goal
Build a recommendation engine to help with user retention
- Using streams of data provided by Linden Lab
- Web interface for use outside of Second Life
- or within Second Life's built-in web browser.

Approach and Methods
3 rounds of making and testing recommendation algorithms:
- Algorithms rank regions (256 meter X 256 meter patches of land in Second Life).
- Top ranked regions are returned by algorithms and presented for feedback.

Limitations on Data Available
- Very limited amount of useful data about second life regions and objects.
- Most algorithms based on behavioral characteristics (population, economic behaviors).
- Data was anonymized, limiting attempt to make algorithms personalized.

Gathered feedback from users with web-based survey:
- Asked for users to rate regions returned by algorithms on 1-5 scale for each of (1) how much they liked the regions and (2) how much they thought others would like it.
- Also gathered comments about results.

Algorithms Tested
Round 1:
- Based on long-term data:
  - Most LS spent
  - Most accepted group invitations
  - Most chat messages
  - Most IM messages (subset of chat)

Round 2:
- Based on real-time data:
  - Most chat messages
  - Most people-seconds (dwell time)
  - "Freebie Dwells" - Most dwell time X number of zero LS transactions
  - "Dwell x Age" - Dwell (person-seconds) with each person weighted by their lifetime use in minutes

Round 3:
- Based on near-realtime data:
  - "Dwell x Picks" - Dwell x number of times a region is someone's pick
  - Pagerank-inspired algorithm based on travel between regions
  - Modified round 2 algorithm

Results
Round 1 algorithms performed poorly.
- Modifications of round 2 algorithms tested in round 3 did not show uniformity in rating improvement (in fact, most got worse).
- Many top rated algorithms use dwell.

Conclusions:
- Realtime or Near-Realtime Recommendations are extremely necessary for good results.
- "Dwell x Age" and "Freebie Dwells" most comparable to the showcase control by the quantitative feedback.
- Presence of avatars important for region quality.
- Free collectibles attractive to new users.

Implementation Possibilities
- A map of regions that highlights any quantitative feature of interest.
- A hallway of doors inspired by "The Matrix" leading to many distant locations.
- A stumbleupon-inspired bar at the top of the viewer could gather feedback and lead to new places.