Using cultural algorithms with Katz centrality and social theory in a graph-based approach to...
predict who you will eventually becoming friends with!
Through millions of years of cultural evolution, humans are no longer definitively constrained to being just biological creatures, but social creatures as well. Cultural evolution has since achieved a greater impact over biological evolution in influencing human behavior.
As social creatures, we are predisposed to constantly form and alter our social networks to satisfy our need for social interactions to sustain life.
We have tendencies to form our social circles based off several identifiable criteria such as...

This tendency to judge allows us to filter out the large subspace of participants that is the population that subsides within our surrounding environment and selectively choose who we become friends or associate ourselves with.
Due to human behavior, we are always redefining what it takes for someone to be our friend. Because of this... (growth and decay)... heterogeneous as oppose to homogeneous.
Analysis of social networks has since become a trending topic over the recent years where several recommendation systems have emerged and evolved. A cause for this is due to rapid growth of web technologies that allow us to adequately and efficiently gather information pertaining to human social interactions. Many exist to provide a more satisfying service to allow users to connect with those whom share similar interests...
1-2 hop distance only
Friend-of-friend
Multiple hops; >1
Structural; purely graph-based
No explicit correlation between potential friends...

Relationship of these potential friends across multiple hops is a purely structural one in which the label of being n hops away from a friend simply means they are part of the same graph or community. Aside from being part of the same community, there exists no explicit correlation between a friend and another friend that defines their potential friendship.
Genetic algorithms
Graph-based [induction]
Link mining
Ranking, Centrality
Social theory
Key Issues

- Heterogeneity
- Better define/rank of criteria for friendship
- Multiple hops
- Essentially, cover breadth and depth
Prior research has suggested recommendation services that use various techniques to satisfy the breadth and depth of a social network in searching for potential friends. Research using methods such as... hae produced notable results. However, alone, these methods have not fully accounted for the entire scope of friend recommendation issues... heterogeneity/multiple hop.
Silva, et. al.,

A Graph-based Recommendation System Using Genetic Algorithms, 2010
- Analyze sub-graph
- Root user
- 3 degrees
- Behavioral patterns relating to root user
- Friend-of-friend
- Doesn’t cover a large space
- Only explores relative to a root user
- Need more defined criteria
Kuan, et. al.,

Finding Friend Groups in Blogosphere, 2008
- Purely network, transitive extension-based algorithm
- 1.5 clique extension method
- Does well in finding structures (groups of friends or communities)
- Doesn’t account for heterogeneity
- Lacks consideration of [explicit] human behavior
Wang, et. al.,

*Graph-based Recommendation on Social Networks, 2010*
Similar to Kuan, et. al.

- Uses Random Walk with Restarts
- Performs better than current implementation of friend recommendation services
- Human behavior...
Zhang, et. al.,

Recommendation Over a Heterogeneous Social Network, 2008
Emphasis on addressing heterogeneity... formalized as a ranking problem... uses Random Walk to generate pair-wise learning algorithm to learn the weight of each type of relationship in the model... This is useful in more effectively determining a set of criteria in how we make friends. However, this research is focused on non-personalized recommendations but can be extended to be more personalized by combining user behavior and preferences.
What’s missing?

- Heterogeneity
- Human behavior and preferences
- Multiple hops
- (Friend prediction: eventual friendships)
My approach

- Cultural algorithm (contains belief space)
- Closeness centrality (Katz or PageRank)

Belief space containing user preferences/behavior: users closes to the root user will be able to update the belief space. -- Covers depth.
Closeness centrality: find important ties... people that may be able to bridge a huge community to the root user.
Conclusion

- Issues in fine-tuning a better social network friend recommendation system
- Prior/Ongoing research
- My approach