TITLE:
Applications of Competition graphs and (1,2)-step competition graphs

DESCRIPTION

In the 1960s, Cohen developed competition graphs to model ecosystems. Since then, a lot of theory has been developed on the subject.

Here, we examine:
1) Previous research regarding competition graphs and (1,2)-step competition graphs of food webs
2) Competition graphs and (1,2)-step competition graphs of a specific food web

This project furthers previous research by:
1) Furthering theoretic research on (i,k)-step competition graphs by exploring new theory and computation in this area
2) Relating competition graphs and (i,k)-step competition graphs to possibly new application areas

MILESTONES AND/OR GOALS

Week 1:
- Complete the education module, “The Biology and Mathematics of Food Webs”, by Thursday, 6/1/2017
- Attend the talk at 11:00 PM in CU 401
- Enter the title, description and milestones/goals into the Wiki by Friday, 6/2/2017, midnight
- Update Wiki at end of week or during week to reflect what has been accomplished
- Read (1,2)-step competition graph of a tournament and have questions ready for Tuesday, 6/6/2017

Week 2:
- Meeting Wednesday, 6/7, with mentor
- Discuss the paper from last week—prepare to answer questions and/or ask them!
- Begin reading Kaitlyn Ryan's master’s thesis, which gives a huge amount of information regarding the biological background, math background, and some statistical information for this topic. Make notes and questions for Thursday’s meeting.
- Begin reading “A Characterization of Competition Graphs”
- Participate in the talk and luncheon at 11:30 on 6/8, CU 401
- Start to compare the competition graphs and (1,2)-step competition graphs by using some small food webs from the initial food web packet, and by creating your own small food web examples.
- Start learning LaTeX (Carissa—Max can tutor)
- Update Wiki at end of week or during week to reflect what has been accomplished

Week 3:
• Mentor meeting on **Tuesday, 6/13**
• Mentor meeting on **Thursday, 6/15**
• Attend working lunch on **Thursday, 6/15**, lunch is provided
• Begin to think about where you would like to take your own research. We can talk about this on both Tuesday and Thursday
• Use LaTeX to write up some of your findings
  o Experiment with creating a small food web and competition graph and place it in your LaTeX document
• Update Wiki at end of week or during week to reflect what has been accomplished

**Week 4:**

• Begin to look at competition graphs and (1,2)-step (alternately some (i,k)-step) competition graphs for each of your focus areas. Start refining the direction of your research
• Continue to write up findings in LaTeX and create figures
• Optional: Meet with mentor on **Tuesday, 6/20** (time TBD)
• Attend the luncheon at **11:30 AM on Thursday, 6/22**
• Meet with mentor on **Thursday, 6/22**, focus will be on what to put on slides for next week’s mini-presentations
• Update Wiki at end of week or during week to reflect what has been accomplished

**Week 5:**

• Have a draft 8 or so minute talk prepared on what has been learned so far by **11:00 AM Tuesday, 6/27**, and be prepared to show it to your mentor. You should have some things that you can use already in LaTeX, so hopefully this will not be too labor intensive
• Continue, as time allows, to work on the research and placing in into your document
• Present mini-presentation to peers and mentors on **Thursday, 6/29**
• Short meeting with mentor after mini-presentations
• Update Wiki at end of week or during week to reflect what has been accomplished

**Week 6:**

• Continue working on research and LaTeX updates
• Meet with mentor on **Thursday, 7/6** to give research updates and discuss where to go from here
• Go to working lunch at **11:30 AM on Thursday, 7/6**; includes talk on making a good poster
• Update Wiki at end of week or during week to reflect what has been accomplished

**Week 7:**

• There should be some conjectures that have been made in your area by now. Determine how to approach a solution or at least support of the conjectures. What more is needed for results? Is it possible to get it before the end of the REU? If not, how can the known information be used to make a satisfying result.
• As needed: Mentor meeting on **Monday, 7/10**
• Go to working lunch on **Thursday, 7/13**
- Meet with mentor on Thursday, 7/13
- Paper outline (brief) based upon last week and this week’s meetings due to mentor via email on Friday, 7/14 by 5:00 PM
- Update Wiki at end of week or during week to reflect what has been accomplished

**Week 8:**
- Mentor meeting: Monday, 7/17; start discussing how to finalize paper and poster
- Begin to finalize some of the results you have; enter theorems, figures, explanations, etc. into LaTeX and create needed figures
- Mentor meeting: Thursday, 7/20, get things in order before mentor is gone next week, this includes your talk for the final week
- Initialize your poster draft and email it to mentor by Thursday, 7/20 in time for us to discuss during mentor meeting
- Participate in the working luncheon on Thursday, 7/20
- Update Wiki at end of week or during week to reflect what has been accomplished

**Week 9:** (Mentor out of town)
- Have updated poster emailed to mentor by 8 PM Tuesday, 7/25; comments from mentor will be back to you by 10 AM on Wednesday
- Make any last minute changes and submit your electronic version to the following email: brylow-reu@mscs.mu.edu by 12:00 PM on Wednesday, 7/26
- Finalize any results that are still hanging out
- Carefully construct a “future research” list that will go into your paper
- Begin to turn your LaTeX writings into a formal paper (base it on papers you have read regarding competition and (i,k)-step competition)
- Go to luncheon on Thursday, 7/30
- Update Wiki at end of week or during week to reflect what has been accomplished

**Week 10:**
- Draft of formal talk due to mentor by 11:00 AM Monday, 7/31
- Draft of paper due to mentor by 11:00 Thursday, 8/3
- Poster session 1:00 – 3:00 PM on Tuesday, 8/1
- Formal presentations
  - Wednesday, 8/5, 10:00 – 2:00, CU 401, lunch provided
  - Thursday, 8/6, 10:00 – 12:00, CU 401
- Paper due electronically Friday, 8/4 by midnight; send to brylow-reu@mscs.mu.edu
- Last update of Wiki due Friday, 8/4