MIT 7116 RESEARCH METHODOLOGY

Scvientific Research Illustration

Dr. John Ngubiri
ngubiri@cit.ac.ug

Makerere University

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  - There is a need to understand what constitutes the appreciation
- You therefore need to scan out your situation

Research Illustration

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- What, beyond the state of the art we need to know (Gap)
  - Extend knowledge beyond the state of the art
  - Define what is going to be investigated
  - Define the methods

The Celebrity Problem (CP)

A celebrity is a person who knows no body but known by everybody

- Assume we have a group of n people, How can we efficiently locate the celebrity among them (if any)
- Note that as per our definition, we may ave no celebrity but we cannot have more than one celebrity (convince yourself)

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  - If $Q(A, B) = True$, A is not celebrity, possibly B is
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- How many questions are required to confirm Celebrity?
  - $n(n-1)$ questions.
  - In case you also asked a person "do you know your self?", then its n^2
  - Either way, the problem is $O(n^2)$ complex

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- There is a question for every 2 individuals
- n^2 questions among n people with max. 1 celebrity
- For each question, one is confimed a non celebrity
  - Aren't some questions between confimed non celebrities?
  - Doesnt reducing them improve efficiency?
  - To what extent?
- Let us eliminate questions between non celebrities

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- Complexity of new solution $O(n)$, an improvement

Application .....

- Think about how this can be applied in Computing infrastructure....

The Stable Marriage Problem (SMP)

Consider n boys $B = b_1, b_2, b_3, \cdots b_n$ and n girls $G = g_1, g_2, g_3, \cdots\cdots g_n$. Each b_i has an n-tupple representation marriage prefferences in G and each g_j has an n-tuple representation of marriage preferances in B. You are required to make Stable marriage matches $M(b_I g_J)$ so that each boy/girl gets the best possible partner given the circumstances (preferance and competition). If two matches $M(b, g)$ and $M'(b', g')$ exist where g' is higher than g in the preferance of b and at the same time b is higher than b' in the preferance list of g'. then M and M' are unstable.

Novel Solution/ "State of Art"

- For every boy
- map to a gal of best choice
- if two boys coincide on a girl
- check who is higher on girls list and boy moves to the next choice
- Repeat till no more adjustment is needed

Some Partinet Questions

1. Would the solution be the same if we started with the girls? What is the implication?
2. Can we quantify stability?
3. Is the approach fair to boys? Girls? Can we quantify fairness?
4. How would we solve it when we consider:
   ties?, incomplete lists?, Non linear Preferances?
5. Can we write an improved approach to address the issues above?

Thing of an aspect of Research

- Post it on the discussion forum
- Justify what you think is the knowledge to add