Building Teams: A Co-operative Game Theory Approach and Scalable Solution

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Semester Project
No of Students 1.
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1. Background and Project Description

   Often teamwork is needed to achieve the goals. For example, we need to create a 3D image of a city. For this, we need to take 2D images at various angles and drones are very handy for these tasks. However, a single drone cannot achieve this. There are multiple companies offering their drone services of varying capabilities. We need to form the coalition of these drones to make maximum benefit of their capabilities.

   Another example is, expert crowdsourcing platforms like oDesk where moderate size software development task are proposed and the requestor recruit the software developers over the platform specific to the task. Often the requestor need to select a pool of developers to finish his task as it calls for various programming skills. Thus it needs to build the team for building the required software.

   In this project, we will study coalition formation from co-operative game theory and if a team is formed how to distributed the pay-off among the team members. We will model the above two use cases as a co-operative game and use the solutions such as core, Shapley value from game theory to build an optimal team. However, the exact solutions are not computationally efficient. The aim in this project is to build computationally efficient solutions for coalition formation and demonstrate with these two use cases.

2. Goals/Tasks
   a. Study existing literature of coalition formation and efficient computation of Shapley value.
   b. Design scalable solution for the team formation problem
   c. Implement the solution in Java
   d. Build a front end UI for easy use of the solution by users
   e. (Stretch goal) publish a paper in reputed forum

3. Benefits:
    a. You learn how to model a real world problem as a game theory problem
    b. You get hands on taking theory to practice
    c. Build new solutions that are more practical.
    d. You get good programming practice.

4. Required Skill Set
    a. Good Programming knowledge
    b. Good understanding of Game Theory

5. References

    i. http://oDesk.coom
    j. Shapley, Lloyd S. *A value for n-person games*. No. RAND-P-295. RAND CORP SANTA MONICA CA, 1952.