DEAMON Model

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Recent growth in technology have led to the development of various light-weight sensor devices that can be woven into the physical environment of our daily lives. such systems enable on-body, mobile health-care monitoring, Smart-Phone sensor sharing, Participatory Sensing and much more. Our interest particularly lies in Smart-Phone Sensing, Participatory Sensing. Energy efficiency is the most important performance matrices in sensor monitoring, sensor data processing and sharing. In this Model, the sensing is based on various tasks, where the tasks are created by some applications (Task Publisher) and shared with Smart-phones and neighbouring Sensor nodes.
After gathering information based on the required task they participants sensors node (Masters and helpers) transfer the report back to the application. The Communication can be done through Internet, Blue-tooth, Wi-fi etcetera.

In our Model helpers are nearest participants such as Smartphones users, Surrounding Sensors. In our system model different helpers may have same kind of sensors but with dissimilar energy consumptions. We will choose those helpers, which covers more sensor types with minimum energy consumptions for the tasks. This is weighted set-cover problem. For weighted

set-cover assignment problem we apply Greedy algorithm.

We are considering that the tasks are Conjunctive Normal form, while the events are either Conjunctive Normal Form or Disjunctive Normal Form.
For example

Task = (walking or running, at the park and toward North, when it is raining or chilly)
F = (act =walk or running) and (location = Park and direction = North) and (raining or sunny)

We study the problem of designing and efficient assignment algorithm that assigned the tasks to the helpers (Sensors set) such that covering minimum number of sensor to accomplish the task. By covering least numbers of sensors we can save more energy during the task monitoring. And off-course we will assign task on DEAMON Model, Deamon is boolean condition based algorithm model and it works both on CNF and DNF so that the only boolean true valued sensor are on while other are turned off to minimize energy.

Notations:

$$h_1 = s_{11}, s_{12}, s_{13}, ...s_{1n_1}$$

$$h_2 = s_{21}, s_{22}, s_{23}, ...s_{2n_2}$$

$$h_3 = s_{31}, s_{32}, s_{33}, ...s_{3n_3}$$

$$.....$$

.....

$$h_N = s_{N1}, s_{N2}, s_{N3}, ...s_{Nn_N}$$

s_i is set of sensor in h_i function
T_i = set of sensor types h_i can monitor

F= $C_1 \bigwedge C_2 \bigwedge C_3 ..... \bigwedge C_n$
literals
$(l_1 \bigvee l_2 \bigvee l_3) \bigwedge (l_4 \bigvee l_5 ....)$
$F = f(t_1, t_2, t_3, ...t_m)$

We study the problem of assigning and efficient algorithm that assigned the helpers into "k" Covers such that as many tasks are monitored. We are given a finite set of helpers, corresponding the tasks to be monitored, a collection (S_{ij}) of subsets of helpers, where each S_{ij} represent a helper and contains the tasks that helper monitors.

$\sigma(S_{ij}) \in T$

$ValidAssignment$

$\forall_i$=1,2,3,.....m , $t_i \in T \propto (i)$

Assignment A = $(a_1, a_2, a_3, ...a_m,)$ so

$1 \leq \mathrm{a}_i \leq Nand$

$\{\sigma(s) \mid \in \mathrm{s}_i\} \propto \{1, 2, 3, ...m\} \times \{1, 2, 3, ...N\}$

These helpers need only become active after notification that the task has taken place, rather then using all the helpers all the time to monitor for the tasks, SET-K-Cover solution provide a simple way for helpers to share in the monitoring of a task, in such way the energy consumption can be minimized.

We will discuss three algorithms to solve the Set K-Cover problem: Randomized, Distributed Greedy and Centralized Greedy. Randomized algorithm is an assigning the cover itself chosen randomly from all possible covers, where as in distributed greedy algorithm each helper assign itself,and task monitored by the cover. Centralized greedy is assignment process algorithm which gives best result for energy efficient assignment of helpers .