

## CrowdSim User Manual

### ❖ System Overview

The hybrid simulation model is an intelligent aid for project managers:

- A software system based on Anylogic simulation tool
- Graphical scheduler system for failure notification
- System category:
  - provides failure awareness prediction to investigate the task execution model in open software development platforms
- Operational status:
  - Operational

### ❖ Getting Started

The hybrid model is designed based on three sub models, Platform, Task Completion, and Agent Decision. This part explains the features each sub-model provides.

- *Platform:*
  - Agent Arrival:

Agent arrival in the platform follows an event. The event rate follows Poisson distribution. Each agent is randomly associated to a specific experience level based on Topcoder's worker experience metric. There is also a random reliability level assigned to the workers as soon as they arrive in the platform. The user of this model should have empirical knowledge about the mean, max and min of workers in the platform they wish to simulate. The statistical information of the workers updates the workers arrival based on Poisson distribution in the platform.

⚡ WorkerArrival

Min	<input type="text"/>
Mean	<input type="text"/>
Max	<input type="text"/>

– Task Similarity:

According to empirical study, task similarity follows uniform distribution with mean of 0.33. In this model we provide the option of changing the mean of task similarity based on the chosen execution strategy with minimum of 0 and maximum of 1. The end user of this model should provide the average degree of task similarity to update the model and make sure that the simulation result reflects the real-world situation.



• *Task Completion:*

– Task schedule:

Task execution in the platform follows the Project scheduling plan provided by the task owner/ project manager. The specific schedule uploads in the Arrival Schedule which will be used for task execution. Therefore, the end user needs to know the exact scheduling plan for the crowdsourced project.

**ArrivalSchedule**

**ArrivalSchedule - Schedule**

Name: ArrivalSchedule  Show name  Ignore

Visible:  yes

**Data**

Type: real

The schedule defines:  Intervals (Start, End)  Moments

Duration type:  Week  Days/Weeks  Custom (no calendar mapping)

Repeat every: 1 days

Snap to: 9/27/2010

Default value: 0


Loaded from database

Start	End	Value
3:00 AM	6:00 AM	0.5
6:00 AM	7:00 AM	1.8
7:00 AM	8:00 AM	4.0
8:00 AM	11:00 AM	7.5
11:00 AM	3:00 PM	5.2
3:00 PM	5:00 PM	3.1
5:00 PM	6:00 PM	1.2

**Action**

– Task Arrival:

Task arrival in the model follows an event. The event is based on the task schedule calendar, starting from the day the entire project starts. Tasks will be uploaded automatically based on their time sequence.

 TaskArrival

**TaskArrival - Event**


Name: TaskArrival  Show name  Ignore

Visible:  yes


Trigger type: Timeout

Mode: Cyclic

Use model time  Use calendar dates

First occurrence time (absolute):  ArrivalSchedule days

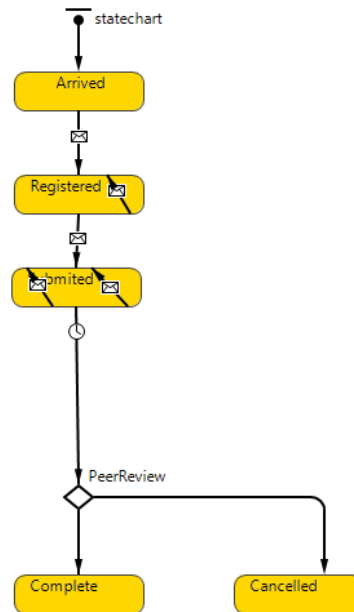
Occurrence date: 4/ 4/2018 8:00:00 AM

Recurrence time:  1 days

Log to database  
[Turn on model execution logging](#)

– Task Status:



Task status is following the state chart based on Topcoder task flow at any given time.



– Competition level:

A collection list for both task registrants and task submitters is introduced.

At any given time, the model provides the list of registrants and submitters for the executed task.

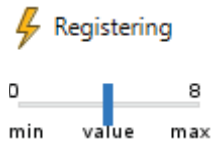
 TaskRegistrantList  TaskSubmitterList

• *Agent Decision:*

– Registration:

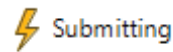
Agent's decision to register for a task follows an event with specific rate per day. The rate of registration can be manually updated based on the platform

strategy. According to empirical results, the average list of tasks per agent is 8, therefore, the maximum registration rate per agent can be 8.



– Submissions:




Agent's decision for submission in this model follows a rate of 0.51 per day based on available empirical studies.



– Participation Level:

A collection list for all task registrations and task submissions and task winnings per agent is introduced.

At any given time, the model provides the list of task registration and task submission and task winning for an available agent.

 WorkerRegistrationlist  WorkerSubmissionslist  WorkerWininglist

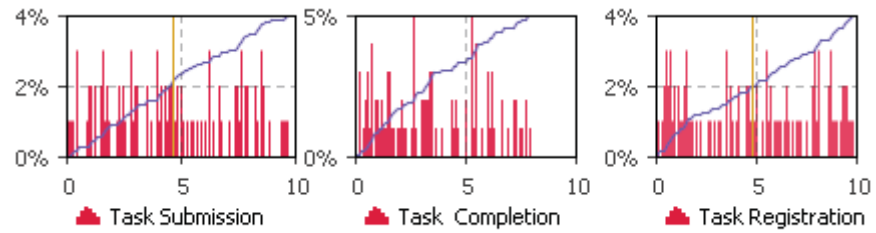
• Hybrid Simulation Outcome:

The outcome of the model is based on two levels, the overall platform level and the task level.

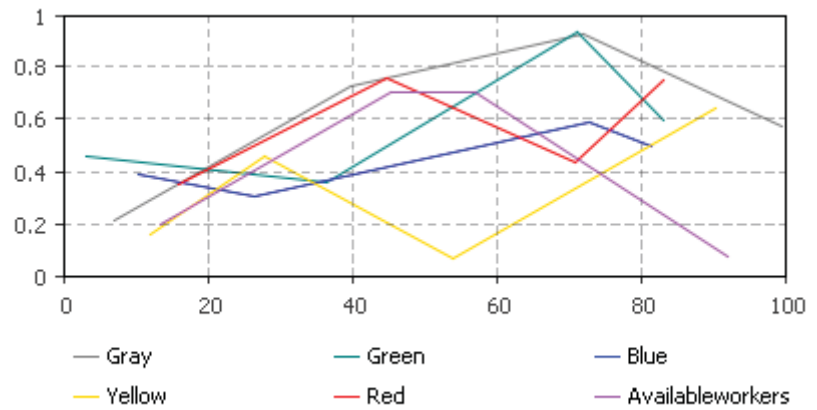
– Platform Level:

Platform level in this model provides two sets of results:

1- Distribution of task registration, task submission and task completion patterns in the platform.



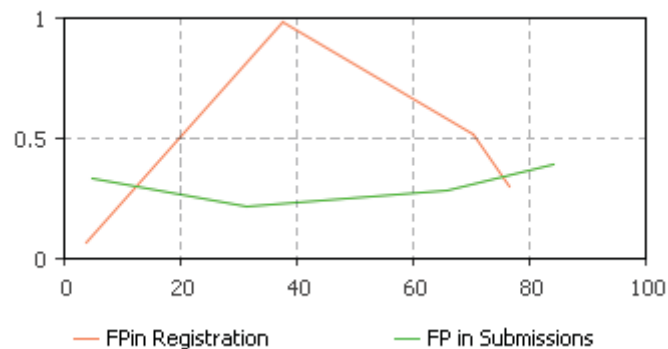
2- Arrival agents in the platform and their performance per experience belt at any given time.



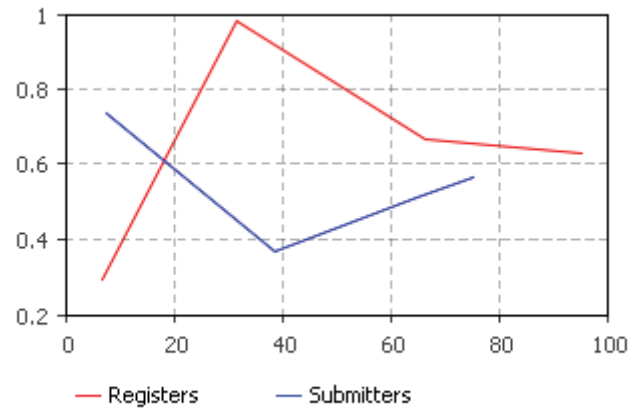
– Task Completion Level:

Task completion level in this model provides three sets of results:

1- Task failure prediction models in both registration and submission state at any given time per task.



2- Number of registrants and submitters at any given time per task.



3- Agents' performance per agent experience per task.

