Form Creation Manual

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1 Overview

This manual should provide a detail description on how to create and custom the Excel form to run emulation on both Game Theory and Stable Matching

Important It should be kept in mind that customization is only applicable to functions, value of properties, the numbers of entity, and the number of property of an entity. *The structure of any form, most of the time, must be kept as provided.*

2 Game Theory

The form have 4 sheets that must be placed in the following order:

1. Problem Information
2. Special Player

3. Normal Players
4. Conflict Sets

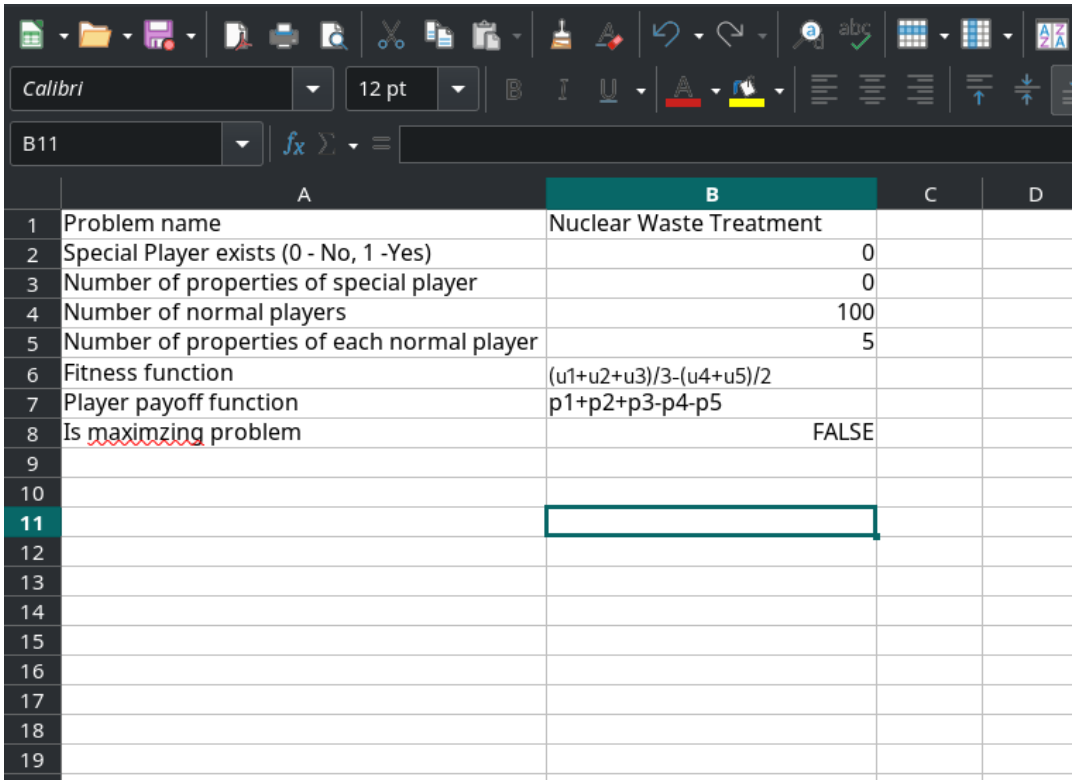
Or without *Special Player*:

1. Problem Information
2. Normal Players
3. Conflict Sets

Important Special Player currently have no effect on the emulation. However, *Special Player can be represented as a Normal Player*. Therefore, the *Special Player* sheet customization will not be described here, hence from now on player should be understand as Normal player

2.1 Problem Information

This sheet is used to provide metadata for the emulation such as: number of normal player, number of property for a strategy. The structure is as follow:



	A	B	C	D
1	Problem name	Nuclear Waste Treatment		
2	Special Player exists (0 - No, 1 -Yes)	0		
3	Number of properties of special player	0		
4	Number of normal players	100		
5	Number of properties of each normal player	5		
6	Fitness function	(u1+u2+u3)/3-(u4+u5)/2		
7	Player payoff function	p1+p2+p3-p4-p5		
8	Is maximzing problem	FALSE		
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

Problem Information

The data of column B must be provide in the order of column A, the data parser always assumes the value of column B have a consistent order and will not check the label in column A

2.1.1 Is Maximizing

Determine if the best solution - strategy is to have the greatest fitness or otherwise, with *true* - is to maximize, any other value will be interpreted as otherwise

2.1.2 Payoff Function

Define how to calculate payoff from a player strategy. It should be note that this function will be the default for any player without their own payoff function

1. Default

Declare $default$ or left empty - payoff will be the sum of the strategy's properties

2. Custom

   Available operators:

   - operators $+$, $-$, $/$, $*$, exponent
   - constant e natural log base
   - $abs(x)$, $sqrt(x)$, $sin(x)$, $cos(x)$, $tan(x)$
   - natural and decimal number - fix value

   Variable:

   - p_i reference to property i of this player's strategy
   - $P_j p_i$ reference to property i of player j's strategy

   Example: $sqrt(p1) + 12 + p2$

2.1.3 Fitness Function

Determine how the Nash Equilibrium should be evaluate

1. Default

   Declare $default$ or left empty - fitness will be the sum of the strategy's properties

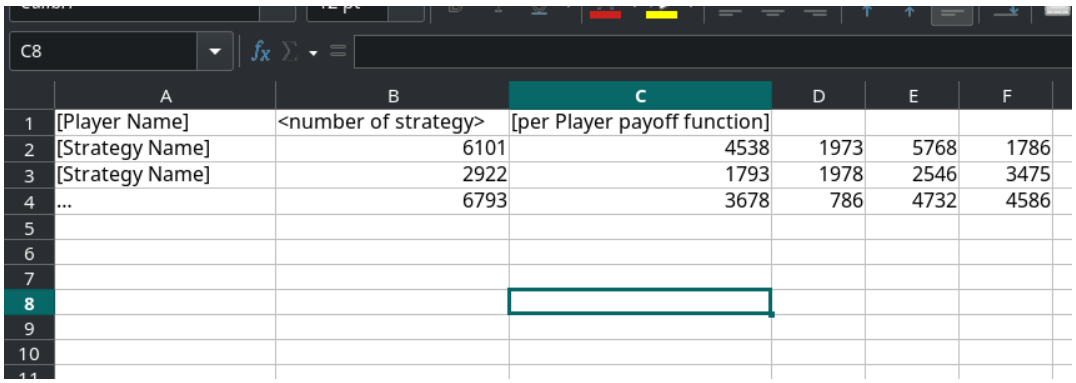
   Other defaults:

   - SUM
   - $AVERAGE$
   - MIN
   - MAX
   - $PRODUCT$: multiply all the
   - $MEDIAN$
   - $RANGE$: MAX - MIN

2. Custom Share the same operators as payoff function but variable is limited to only u_i which represents a player's payoff for their strategy

   Example: $u_1 + u_2 + e$

2.2 Normal Players



Strategies & Properties

Above is the general form to declare player's strategies and properties of strategies

- Player Name : optional, will be filled as Player <count> if empty
- Strategy Name : optional, will be filled as Strategy <count> if empty
- number of strategy : required
- per Player payoff function : optional, if empty default to payoff function defined in the 1st sheet
- value from B2 to F4 : required - must be a number, properties of a strategy

Important the number of property must be as the value declared in the 1st sheet and all strategy must have the same number of property, if more will be ignore by the parser.

2.3 Conflict Set

At any given iteration if the 2 players make these strategy the fitness will be reduce, which be declared in the following way

```
<player 1>, <strategy>, <player 2>, <strategy>
```

Example: $1, 3, 4, 5$ - conflict happen when Player 1 choose 3 and Player 4 choose 5