Event handling using static and dynamic task allocation strategies

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The goal is to optimize the number of tasks performed in a certain amount of time.
Experience

• General goal

• Specificities
  – Whithout weights
  – 15 weights for colors - PSO
  – 17 weights for colors, camera and radio - PSO
General Implementation

epuck_crown.c

main

reset

fitfunc

update_camera_values

get_direction

send_local_emission

receive_local_emission

choose_color
• Update camera values
  - Get new image with camera
  - Analyse one horizontal line in middle
  - Store number of pixels of each color, the number of tasks and their center
General Implementation

• get_direction
  – Receives the color chosen
  – Selects the closest task
  – Returns the direction (left, right, middle)

• choose_color
  – Robots choose color with highest stimuli
  – Different on each experience
General Implementation

• **send_local_emission**
  – Sends the color chosen by the robot and the number of pixels of this color

• **receive_local_emission**
  – Receives the data and stores it

• These two functions are present on the third experiment
General Implementation

• Robots displacements
  – They move at constant speed
  – Go straight for a task
  – If no task visible, rotate on itself
  – Slow down when close to a task to perform it
General Implementation

• Fitness value
  – Based on completing 50 tasks
  – $Fitness = \frac{1000}{TimeToComplete}$
  – TimeToComplete has a Timeout (400 seconds)
1st Part: Task handled without weights

• No radio broadcasting
• Homogeneous robots
• No preference for certain color
Adding weights on the camera

• Different weights on each robot
  – Red
  – Green
  – Blue

• ColorChoice = \( NbrPixels \times W_{\text{color}} \)

• Run after an optimisation given by PSO
Radio broadcasting

• Same as the second experience with a radio

• Added weights for camera vs. radio
Results - Expectations

• Expect improvement after each experience

• Repartition of task between E-puck

• Expect higher ratio for camera than for radio
Result – 1st experiment

- Perform on 150 runs
- Mean: 228 sec
- SD: 29 sec
Result 2\textsuperscript{nd} experience

- Weights & histogram

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>Green</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-puck 1</td>
<td>0.539</td>
<td>0.405</td>
<td>0.189</td>
</tr>
<tr>
<td>E-puck 2</td>
<td>0.029</td>
<td>0.905</td>
<td>0.955</td>
</tr>
<tr>
<td>E-puck 3</td>
<td>0.135</td>
<td>0.716</td>
<td>0.838</td>
</tr>
<tr>
<td>E-puck 4</td>
<td>0.061</td>
<td>0.320</td>
<td>0.236</td>
</tr>
<tr>
<td>E-puck 5</td>
<td>0.456</td>
<td>0.742</td>
<td>0.584</td>
</tr>
</tbody>
</table>
Result 2\textsuperscript{nd} experience

- Perform on 100 runs
- Mean : 255 sec
- SD : 33 sec
Result – 3rd experience

- Weights & histogram

<table>
<thead>
<tr>
<th></th>
<th>Red</th>
<th>Green</th>
<th>Blue</th>
<th>Camera</th>
<th>Radio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E-puck 1</strong></td>
<td>0.044</td>
<td>0.232</td>
<td>0.906</td>
<td>0.170</td>
<td>0.761</td>
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<tr>
<td><strong>E-puck 2</strong></td>
<td>0.478</td>
<td>0.785</td>
<td>0.264</td>
<td>0.170</td>
<td>0.761</td>
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<tr>
<td><strong>E-puck 3</strong></td>
<td>0.249</td>
<td>0.193</td>
<td>1.000</td>
<td>0.170</td>
<td>0.761</td>
</tr>
<tr>
<td><strong>E-puck 4</strong></td>
<td>0.525</td>
<td>0.771</td>
<td>0.875</td>
<td>0.170</td>
<td>0.761</td>
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<tr>
<td><strong>E-puck 5</strong></td>
<td>0.002</td>
<td>0.882</td>
<td>0.633</td>
<td>0.170</td>
<td>0.761</td>
</tr>
</tbody>
</table>
Result – 3rd experience

- Perform on 50 runs
- Mean: 275 sec
- SD: 37 sec
Discussion about results

• Don’t match the expectations
• Improvements
  – PSO
  – Duration of a run
Conclusions

- First experiment was good
- The two others were disappointing
- Waiting to see other groups