Road Sign Recognition

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Plan

I. Project Goal
II. Recognition Strategy
III. Implementation in Webots
IV. Results
V. Performance strategy
VI. Odometry
VII. Conclusion
I. Project Goal

- Get out of the maze
- As fast as possible
- Reading Road Signs
- Using supervisor
- Processing odometry

Absolute Frame of the maze and exit trajectories
II. Recognition strategy

- FFT on Matlab
- Understanding of peak frequencies along rows and columns

Pictures analysing with FFT algorithm on MATLAB

Recognition Strategy to implement

Read the image
Convert RGB image to grayscale

Normalize the vector along the rows
Normalize the vector along the columns

Calculate max FFT of the vector = MR
Calculate max FFT of this vector = MC

Calculate the max frequency ratio = MR/MC

- If $MR < MC$
  - TURN LEFT
- If $MR > MC$
  - TURN RIGHT
- If $MR = 0$ and $MC = 0$
  - TURN BACK
III. Implementation in Webots

A. Controller
- run_braitenberg()
- process_image()
- run()

A. Supervisor
- Display exit time
- Display absolute positions

Pseudocode of the strategy

```
Main
- while (1)
  - switch (operation_mode)
    case AVOIDANCE
      - move forward, sensor control, Braitenberg
      - check distance → if > m, operation_mode = STOP
    case STOP
      - take n pictures, compute n times FFT & mean
      - interpretation with FFT → return “action”
      - call the “direction” function with “action”
      - back to case AVOIDANCE

Direction
- switch (action)
  case 1
    - turn left
  case 0
    - turn right
  case -1
    - turn back
```

IV. Results

[supervisor] Robot has escaped in 22.527937 seconds
INFO: 'supervisor' controller exited successfully.

E-puck escaping the maze from Start 2
IV. Performance Strategy

- Distance tests
- Lighting conditions
- Size of the picture
- 100% success for non-noisy and noisy experiments

Performance strategy according to exit time
V. Odometry

- Motion sensors
- Rotation Matrix / Dead Reckoning
- Errors
VI. Conclusion

❖ Goals reached
  ➢ Functional e-puck
  ➢ Get out of a maze
  ➢ As fast as possible
  ➢ High rate of success

❖ Strategy can be improved
  ➢ Filter Window average
  ➢ Higher speed ?
  ➢ Correct problems

❖ Develop our skills with Webots & C-programming
❖ Face intensive work
❖ Raise autonomy & teamwork
Thanks for listening!

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