Deep Learning lab

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Outline

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1. **Introduction**

2. Storing target

3. Coloring

4. Gridding

5. Final results

Problem Statement

1. Visual planning imitating A*
2. Changing target

Old results

- The A* star was our baseline for training, it always solves the problem.
- The accuracy of our agent without changing the target was 100%.
- The accuracy of our agent with changing target was on average 31%.

Outline

Adding target to state

- Looking up the destination on Google maps before going usually helps finding it.
- In addition to the history of the last 4 states, we save an additional state of the local view of the target position.
- Average accuracy with saving target: 70% Average accuracy : 31%

Outline

Simple coloring

Dividing the wall into "districts" with distinct colors.
Average accuracy with colouring: 81%
Average accuracy : 31%

Figure : Simple colouring

Gradient coloring

Coloring the walls with a gradient across the whole map.
Average accuracy with colouring: 66%
Average accuracy : 31%

Figure : Gradient colouring

Outline

Distance accuracy

- Instead of giving a score 0 for not reaching the target, we use the distance accuracy function:

$$\frac{1}{1 + \lfloor d/g \rfloor^2}$$

  where d is the distance from the target and g is a constant.
- The idea is to give partial credit if the agent got close to the target even if it didn't reach it.

Gridding

- We tried to divide the map into grids of size *g* while sampling target locations (only during training).
- The reason is to ensure that the density of distribution across the map is the same.
- Gridding didn't affect the results that much for small maps.
- Gridding shows improvements on big maps.

Outline

We ran 8 experiments; for each we train 7 times and test 10 times for each of them, and these are the average results.

Target	Gridding	Color	Accuracy	Distance Accuracy
No	No	No	31%	-
Yes	No	No	70%	-
Yes	No	Simple	80%	-
Yes	No	Gradient	66%	-
Yes	Yes	No	70%	72%
Yes	Yes	Simple	79%	81%
Yes	Big	Simple	77%	82%
Yes	Big	Gradient	64%	71%

We also tried a bigger map

For the big map, we ran 4 experiments; for each we train 2 times and test 10 times for each of them, and these are the average results.

Target	Gridding	Color	Accuracy	Distance Accuracy
No	No	No	31%	-
Yes	No	Simple	57%	-
Yes	Big	Simple	62%	65%
Yes	Big	Gradient	49%	55%

Conclusion and Future Work

- Knowing the local view of the target helps the agent strongly to find the target.
- Here we can conclude that Gridding is useful only for the big maps.
- Coloring the walls helps the agent to identify parts of the map as landmarks.

In the future we can try to find better coloring strategies.