

Reinforcement Learning for Bomberman

Final Project for the lecture:
Fundamentals of Machine Learning

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(Order alphabetically, don't take it personal)

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1 Abstract

SOME TEXT - Look at the end in Conclusion for some useful links

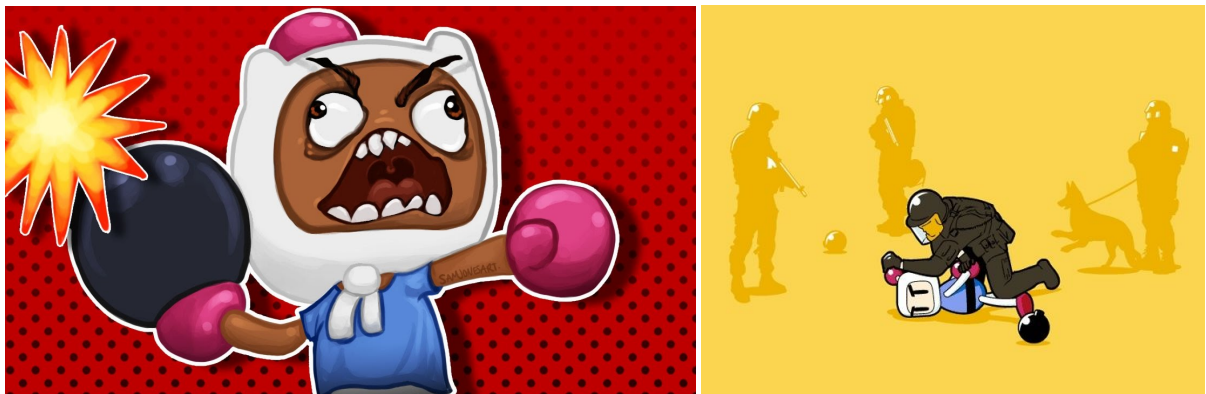


Figure 1: he acts as a dement (left) he is often seen as a terrorist(right)

2 Introduction

[TODO: some text]

3 Explaining the Framework

Features:

A1: Assumption:

- 1) BOMB -> others[i] -> agent (don't die)
- 2) BOMB -> BOMB -> agent (die)
- 3) BOMB -> crate -> agent (don't die)

C1: Consideration:

use s.bomb_power

C2: Consideration:

use bombs left

- FOR STEP 1:

- 1.) Reward the best possible action to a coin, if it is reachable $F(s,a)=1$, otherwise $F(s,a)=0$. 'BOMB' and 'WAIT ' are always 0.

- FOR STEP 1 & 2:

- 1.)
DONE
 - 2.) Penalize if the action follows the agent to death ($F(s)=1$, $F(s,a)=0$. otherwise.
DONE, it could be slightly improved
REMARK: C1?
 - 3.) Penalize if the action follows the agent into a “save”:(Where the bomb won't at some point explode) position. $F(s,a)=1$ otherwise $F(s,a) = 0$. Bombs are always set to 0.
TO BE DONE
 - 4.) Reward the minimal distance that follows to safety if you are in a “Danger zone” (as defined in 3.) $F(s,a)=1$ otherwise $F(s,a) = 0$. If you are not in a “Danger zone” then $F(s,a) = 0$ for all actions. For Bombs always set $F(s,a) = 0$.
TO BE DONE: -> LILY
 - 5.) Penalize invalid actions. $F(s,a) = 1$, otherwise $F(s,a) = 0$.
DONE
REMARK: C2
 - 6.) Reward when getting a coin $F(s,a) = 1$, otherwise $F(s,a) = 0$.
DONE
 - 7.) Reward putting a bomb next to a block.
 $F(s,a) = 0$ for all actions and otherwise $F(s,a) = 1$ for a BOMB if we are next to a block.
DONE
 - 8.) ## Reward the available movements $F(s,a) = 1$, otherwise $F(s,a) = 0$. Remark:
TO BE DEFINE and DONE

Weitere Ideen:

- penalize distance between our agent and the nearest reachable crate.

TD(0) learning

[TODO: some text] Probably not useful, but maybe useful as idea for loading images



Figure 2: Some text

Gradient descent

[TODO: some text] Probably not useful, but maybe useful as idea for loading images

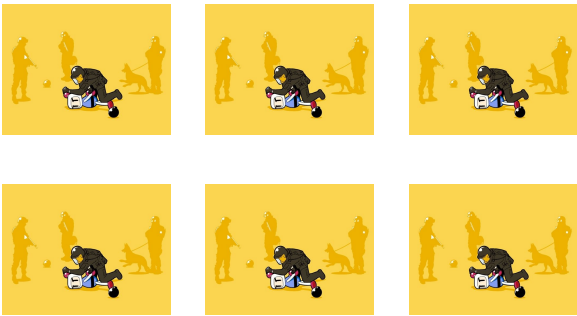


Figure 3: Some text

Bla blah

Other sub chapter

[SOME TEXT].



Figure 4: some text

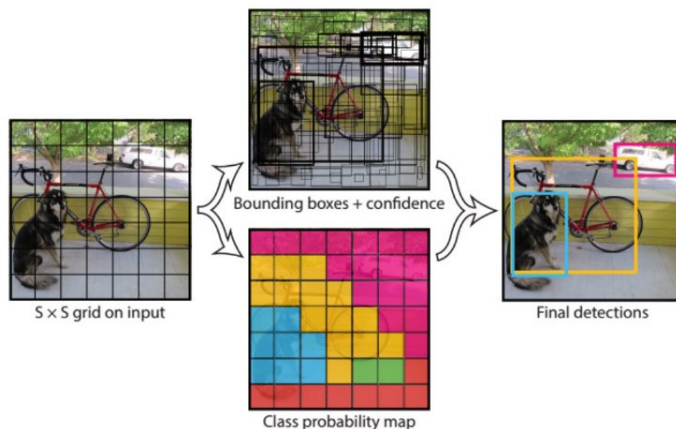
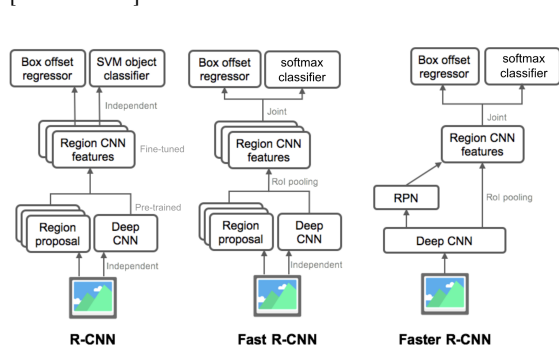


Figure 7: SOME TEXT.

4 Related work

[Some text]



Some text
In 2015, **SOME TEXT**, [?]) (see Figure ??).

Figure 5: SOME TEXT

bla bla

some citation examples [?][?]

5 See figures above (Strategy to also use space and have more variants for the text

SOME TEXT

The YOLO approach to object detection

SOME TEXT

Anchor boxes

SOME TEXT

SUBSECTION

SOME TEXT

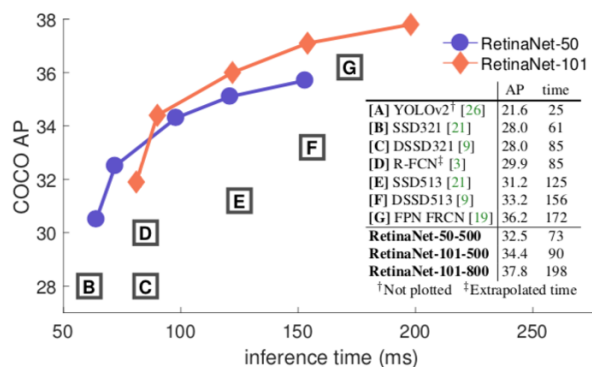


Figure 6: some text

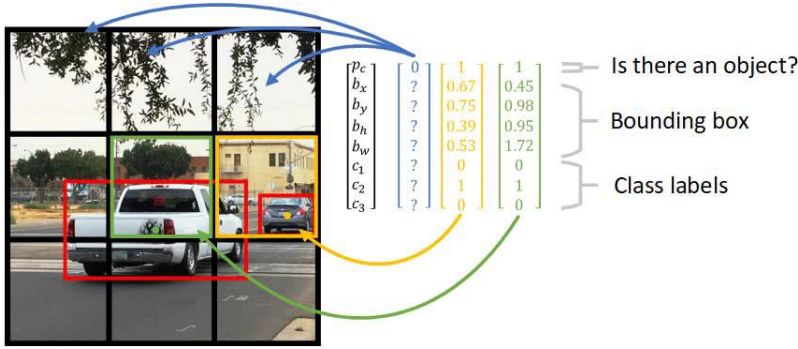


Figure 8: SOME TEXT

SUBSECTION

6 Feature extraction

Some text

7 Evaluation

Some text

8 Results: some Table & other way of loading images

some text

some table

Dataset situation		precision	recall	mAP
name	description			
1 - Simple	Paste cards on simple canvases <i>random rotations, brightness, blurring</i>	0.974	0.996	0.991
2 - Medium	Paste randomly scaled cards on simple canvases <i>random rotations, brightness, blurring</i>	0.946	0.988	0.989
3 - Elaborate	Paste randomly scaled cards on textures <i>random rotations, brightness, blurring</i>	0.937	0.978	0.971
4 - Hardest	Paste randomly scaled cards on textures <i>random rotations, brightness, blurring, less zoom</i>	0.940	0.983	0.973

Table 1: Precision and recall values have been calculated using a IOU threshold of 0.5. mAP values are based on averaged precision values over IOU thresholds of $[0.1, 0.2, \dots 0.8, 0.9]$



success: classification:
Ad: 0.99995, **Ad:** 0.99997



success: classification
As: 0.99757, **As:** 0.99931



success: classification
Jd: 0.99967, **Jd:** 0.99992

Figure 9: Successful cases of detection of images that are pretty representative of the training distribution

Results of further work

Transfer learning

Webcam deployment

9 Discussion and Future Work [Frank & Daniel]

Overview

Training process

Deployment on a webcam

Future Work

10 Conclusion

https://github.com/mlteam-ws2018/RL_boom. SOME USEFUL LINKS (for the reportwriting):
 [for motivation]: https://www.youtube.com/watch?v=xMP-JqFQ_14
 [gd, policy, q-learning]: https://www.ias.informatik.tu-darmstadt.de/uploads/Theses/Sharma_BScThesis_2012.pdf
 [gd, policy, q-learning]: <https://repositorio-aberto.up.pt/bitstream/10216/91011/2/176444.pdf>

References

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