

Description for the Funny Quotes ft. Dominoes Generator

Yuxuan Jiang¹, Ryota Ishii, Tomohiro Harada, Ruck Thawonmas
Intelligent Computer Entertainment Laboratory, Ritsumeikan University
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1. Introduction

Our level generator generates Angry Birds levels that consist of a quote (Fig. 1), a formula (Fig. 2), or a word combined with dominoes (Fig. 3). It is based in part on our previous generator Funny Quotes [1], but to generate a combination of words and dominoes, Monte Carlo Tree Search (MCTS) [2] is used. In MCTS, a level is evaluated by

1. readability of generated characters forming a word
2. variety of blocks
3. usage of dominoes
4. proximity of the proportion of the used area to the golden ratio (1.62)



Fig. 1 Example of a funny quote level



Fig. 2 Example of a formula-like level



Fig. 3 Example of a word-plus-domino level

2. Adjustment of Map Difficulty

2.1 Quote levels and formula-like levels

We assign two degrees of difficulty to quote levels (normal 20%, hard 80%) and change the number of pigs and birds according to difficulty. If the number of initially assigned pigs is more than

Competition's max , they will be deleted according to the degree of difficulty. If the number of initially assigned pigs is less than the number of pigs according to difficulty, it will be increased by placing new pigs before the slingshot accordingly.

As for formula-like levels, the number of pigs is selected from min to max randomly.

For more details on difficulty adjustment on these two level types, please see our CIG 2017 paper [1].

2.2 Word-plus-domino levels

The number of pigs and birds are always set to max , and $max+1$, respectively. We divide the area into four sub-areas. If the number of initially assigned pigs is more than max , one pig will be removed from the sub-area with the highest number of pigs. This is repeated until the number of pigs becomes max . If the number of initially assigned pigs is less than max , new pigs will be placed before the slingshot.

3. Proportion of three level types

If a world-plus-domino level cannot be generated successfully, a quote level and a formula-like level will be generated instead with a probability of 0.95 and 0.05, respectively. And if a quote level cannot be generated either for certain reasons, a formula-like level will be generated instead. There are 100 quotes for generation of quote levels, such as "We will be back", "Need your Vote", and "Relax bro!" Generation of world-plus-domino levels is based on a set of 75 words, each having up to six characters, such as "Love", "Happy", and "Luck!"

References

- [1] Y. Jiang, T. Harada, R. Thawonmas, "Procedural Generation of Angry Birds Fun Levels using Pattern-Struct and Preset-Model," 2017 IEEE Conference on Computational Intelligence and Games, New York, USA, Aug. 22-25, 2017. (accepted for presentation)
- [2] M. Graves, Procedural Content Generation of Angry Birds Levels Using Monte Carlo Tree Search, Master of Science in Engineering Thesis, The University of Texas at Austin December 2016.

¹ He is a graduate school student in Graduate School of Information Science and Engineering, Ritsumeikan University.