

Towards Automatically Answering Video Game F.A.Q.'s

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Suddenly, Questions! Thousands Of Them!

If a player is stuck in a video game, there are two primary online resources:

- Ask for help from an experienced user by posting on a forum for the game.
- Search a text walkthrough written by an experienced user.

Problem

Can we use NLP to automate answering the flood of questions, aided by existing walkthroughs?

Unfortunately, both approaches have issues:

- Repeated questions bury in-depth discussion threads.
- Answering the same question over and over bores experienced users.
- Linear searching of a walkthrough is slow; binary search prone to spoilers.
- Control+F exact string search requires knowing the right keywords.

Life, Universe and Everything: Examples

killed. Look for the higher piece of corner in the northeast corner of the first "house" (it's basically destroyed to the ground). You can stay in this corner until the firing ceases. Then immediately rush over to the next house to the northeast, which is more intact; hop inside and shelter in the northeast corner. When the firing ceases once again, make a break for the fence to the far north. Hug the fence and travel east to the main gate of the Nellis Air Force Base.

You're automatically spoken to and brought to Pearl, one of the elders. A new quest will start, Volare!, and by the look of things you can do various other quests as well. While it's possible to kill the Boomers, there's too many things to do and doing so would be a waste of gameplay. Let's start with the 'Volare!' quest.

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{FallOutT}
{AltoUtFa}                2.11 Volare! [WLK-11]
{LlOutFal}
{LoUtFal}
{OtfFalLo} The Boomers have several problems they need help with. YOUR help.
{UfFalLo} Something involving giant ants and a sunken B-29? You're in, right?
{TFallOst}
|
| QUEST REWARD: 400 EXP.
|
| QUEST OUTLINE: 1. Help the Boomers around Nellis.
|                2. Help Agryll with his patients.
|                3. Do the Sunshine Boogie quest.
|                4. Listen to all of Pete's stories.
|                5. (OPTIONAL) Do the Ants Misbehavin' quest.
|                6. Return to Pearl.
|                7. Speak to Loyal about the Bomber's plan to raise
|                   the bomber from the bottom of Lake Mead.
|                8. Attach the ballast from Loyal to the B-29 at the
|                   bottom of Lake Mead.
|                9. (OPTIONAL) Talk to Jack about getting a rebreather
|                   to swim to the bottom of Lake Mead.
|               10. Return to the shore near the tow winch and use
|                   Loyal's detonator to float the B29 to the surface.
|               11. Let Pearl know your job is done.
|
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AGRYLL: LET'S PLAY DOCTOR TOGETHER

Select this as your active quest and head to the northwest marker, leading you to the Nellis Medical Station. Here, speak with Agryll and ask him what you can mean for him. If you have 40+ Medicine or 35+ Speech you can convince him to help treat the patients. These require 40, 50 and 60 Medicine respectively. If you have a Today's Physician magazine (along with the Comprehension Perk) you can boost your Medicine up to 20 points, possibly recovering all three patients. You get 40, 50 and 60 experience points for helping the patients.

PETE: A BOOMING STORY

Continue to the Nellis Bomber Museum, marked by the northwest quest marker. Enter the building and look to your right (north): Is that a [SNOW GLOBE - NELLIS AFB] lying on the table? Yes it is! There's also an [ILA FANTOMA] magazine on the bed - it's best to grab this while Hidden/Crouched when Pete's asleep. Speaking of Pete, talk to the kid and listen to the story (this will

PC » Role-Playing » Western-Style

Fallout: New Vegas

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QUESTION FROM XEL562

How do I attach the ballast to the B-39 ?

Im at the B-39 in the lake, i cant find any place to attach them to it, the marker just points to the middle of the plane.

5 years ago - [Report Abuse](#)

ACCEPTED ANSWER

johndmes answered:

For the crashed B-29, the two attachment points are under the wings, between the two engines. When you're close enough, a transparent graphic of the ballast will appear at the correct point. Press E to attach each one. You must attach each one separately. Once done, swim to shore at the boat ramp and use the detonator when you hear the beeping sound.

5 years ago - [Report Abuse](#)



ANSWERS

Galahaut answered:

There are whitish/grayish outlines on the bottom of each wing where you need to place the ballast.

5 years ago - [Report Abuse](#)



This question has been successfully answered and closed

"Ctrl-F" Baseline: Mimic Browser Search Functionality

Heuristic Search Term Probability Measure

θ_w is the maximum-likelihood estimate of $P(w \in A^* \mid w \in Q)$ given the input data.

"Ctrl-F" Question-Answering Algorithm

- ① Determine Q = the set of words in the question.
- ② For each walkthrough W :
 - ③ For every contiguous range R of 20 words in W :
 - ④ Calculate $\text{SCORE}(R) = \sum_{w \in R \cap Q} \theta_w$
- ⑤ Return top 5 scoring R

"Segment-F": Inferring Walkthrough Structure

- Plaintext walkthroughs are implicitly structured into headers, paragraphs, tables, and lists.
- Inferring the structure can help group together related sections and identify full answers when keywords are far apart.
- Issue: every walkthrough uses different "ASCII art" to represent its structure.
- Simplified Problem: intelligently break the whole document into segments which can be analyzed as potential answers.

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It says what it says. To elaborate: Do NOT go east or southeast or you will get
killed. Look for the higher piece of corner in the northeast corner of the
first "house" (it's basically destroyed to the ground). You can stay in this
corner until the firing ceases. Then immediately rush over to the next house
to the northeast, which is more intact; hop inside and shelter in the northeast
corner. When the firing ceases once again, make a break for the fence to the
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magazine on the bed - it's best to grab this while Hidden/Crouched when Pete's
asleep. Speaking of Pete, talk to the kid and listen to the story (this will
increase your fame with the Boomers). Go over all options, sometimes using
Science and Repair to impress - and it'll all increase your fame. You're done
here now.
=====
```

"Segment-F": Inferring Walkthrough Structure

Discrete Convolutional Neural Network

Given 4 lines, the kernel takes a pair of adjacent columns, classifies each character as { letter, digit, punctuation, whitespace, other }, then returns a learned weight for the observed arrangement.

The average weight of every kernel operation is then clamped into $[0,1]$ then rounded to determine if there should be a separator between the top two and bottom two lines.

Training inspired by Prorogued Programming [ABS12]

Issue: No supervised data to train DCNN!

Solution: Query user for classifications of randomly-sampled examples, use query answer to back-propagate. If classification is confident (within 10%) then assume correct and don't query user.

Result: Just training over 30 random quad-lines per FAQ of five games created a very good-looking classifier (see prev slide).

BUGGED "Segment-F": Inferring Walkthrough Structure

Definition

$\theta_w^p = |\{i = j \mid w \in Q_i \wedge w \in A_j\}|$ tries to capture unique words.

$\theta_w^S = |\{i \in S \mid W_i = w\}|$ tries to model word distribution over W .

$\hat{\theta}_w^S$ and $\hat{\theta}_w^p$ are their Tf-Idf transformations*.

"Segment-F" Question-Answering Algorithm

- 1 Determine Q = the set of words in the question.
- 2 For each walkthrough W :
 - 3 For every segment S of W :
 - 4 Calculate $\text{SCORE}(R) = \sum_{w \in Q} \hat{\theta}_w^S + \hat{\theta}_w^p + [w \in S] \times \theta_w$
- 5 Return top 5 scoring S

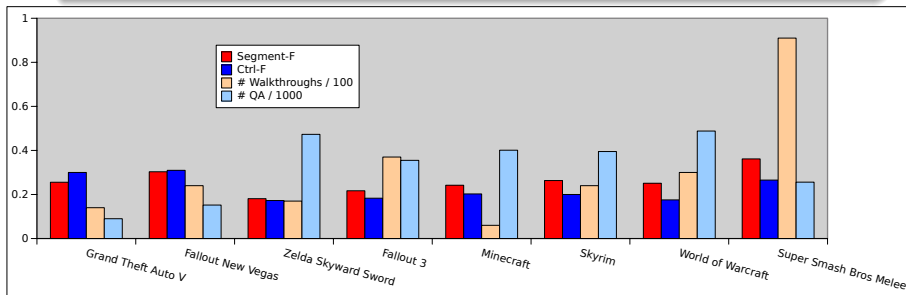
*Term-Frequency times Inverse Document-Frequency, via:

`sklearn.feature_extraction.text.TfidfTransformer`

Evaluation Measure and BUGGED Results

Evaluation Algorithm (average of 5 trials)

- 1 Split question-answer pairs randomly: 80% train, 20% eval.
- 2 Create fake walkthrough by concatenating eval answers.
- 3 Train on 80%, then find % eval questions answered correctly.



- Up to +9.62% Melee, +7.55% WoW, and +6.33% Skyrim, but -4.44% on GTA V. Average improvement of +3.32%.
- Improvement positively correlates to dataset size (roughly).



Mehrdad Afshari, Earl T. Barr, and Zhendong Su.

Liberating the programmer with prorogued programming.

In *Proceedings of the ACM International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software, Onward!* 2012, pages 11–26, New York, NY, USA, 2012. ACM.