

Project option 1: Information Retrieval system

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Abstract. Question-answering (QA) systems are incredibly useful across various domains. QA systems based on information retrieval (IR) techniques in the news domain not only enhance readers' experiences but also aid journalists in improving their work efficiency. In this paper, I design a QA system for a specific news article dataset, comprising two main components: the tokenizer and the reader module. In the tokenizer part, I added a Coreference Resolution technique to reduce ambiguities in the articles. For the reader part, I fine-tuned two pre-trained models, BERT-base and DistilBERT, on the SQuAD 1.1 dataset, and then selected the better-performing model by evaluating them with exact match and F1 score metrics on a sample from the news article dataset. Ultimately, the BERT-base model was employed in the reader module due to its higher exact match score of 46/100 and an F1 score of 66.23. Additionally, I conducted simulated user tests to evaluate the performance of the system in different scenarios. The results demonstrated that there was good interaction between the system and the users.

Keywords: Information Retrieval · Question-answering · BERT-base.

1 Introduction

Natural language processing (NLP)-based question-answering (QA) systems are designed to automatically respond to questions posed by humans in natural language [1]. In various fields, open-domain extractive QA has emerged as a crucial information retrieval (IR) technique. This method extracts answers directly from a contextual dataset and provides them to users. Similarly, in the news sector, QA dialogue systems are proving increasingly essential. For news consumers who seek to quickly access accurate information, these systems allow them to save time by avoiding complex stories and lengthy articles. Additionally, for journalists and editors, QA systems offer significant support by quickly supplying background information to improve the quality of news reporting. These systems can also deliver immediate responses to thousands of users simultaneously, which would be impossible for human staff.

Although extractive QA is highly useful, it also has certain limitations. IR-based QA systems cannot generate novel insights or provide opinions; they only supply answers by retrieving information that has been explicitly stated in the texts they have access to. Furthermore, these systems are limited to answering fact-based questions rather than open-ended ones and can be significantly influenced by vague or ambiguous questions.

In this paper, I construct a question-answering (QA) system for a news article dataset using pre-trained BERT and DistilBERT models. In Section 2, I detail the data preprocessing steps, including the preparation of the training and validation sets, as well as the construction of tokenizers for these datasets. Section 3 outlines the overall architecture of my QA system. In Section 4, I introduce the models selected for use in the system, describe the theories of the evaluation metrics used to measure model performance, outline the fine-tuning process, and discuss the models' performance based on the evaluation results. Section 5 provides an example of a user session with my system and discusses the results of system testing.

2 Preprocessing

2.1 Dataset Preparing

Training Set

This paper's training set will use the well-known SQuAD 1.1 created by Stanford University for QA tasks [4]. The SQuAD 1.1 training dataset consists of 87,599 question-answer pairs derived from 442 Wikipedia articles, with each question having only one answer. Fig. 1 shows an example of the SQuAD training dataset.

According to PolitiFact the top 400 richest Americans "have more wealth than half of all Americans combined." According to the New York Times on July 22, 2014, the "richest 1 percent in the United States now own more wealth than the bottom 90 percent". Inherited wealth may help explain why many Americans who have become rich may have had a "substantial head start". In September 2012, according to the Institute for Policy Studies, "over 60 percent" of the Forbes richest 400 Americans "grew up in substantial privilege".	<p>How many Americans are richer than more than half of all citizens? <i>Ground Truth Answers:</i> 400 400 400</p>
	<p>What publication printed that the wealthiest 1% have more money than those in the bottom 90%? <i>Ground Truth Answers:</i> New York Times New York Times New York Times</p>
	<p>What is considered as a potential advantage for wealth for some Americans? <i>Ground Truth Answers:</i> Inherited wealth Inherited wealth Inherited wealth</p>
	<p>What did the richest 400 Americans have as children that helped them be successful adults? <i>Ground Truth Answers:</i> grew up in substantial privilege substantial privilege substantial privilege</p>
	<p>What do the top 400 richest Americans have more of than half of all Americans combined? <i>Ground Truth Answers:</i> wealth wealth wealth</p>

Fig. 1. An example of the SQuAD 1.1 training dataset.

Validation Set

The news article database for this paper was downloaded from Myuni. As shown in Fig. 2, the original dataset included seven labels. I selected the "id" and "article" columns and verified that the dataset had no missing values and that the "id" served as a unique identifier for each article. Due to encoding issues

when converting article texts from other formats, I replaced incorrect question marks with the correct apostrophes in the text of the "article" column. The cleaned portion of the news article dataset is displayed in Fig. 3.

id	author	date	year	month	topic	article
17307	Marlise Simons	1/1/2017	2017	1	architecture	PARIS ? When the Islamic State was about to be driven out of the ancient city of Palmyra in Marc
17292	Andy Newman	31/12/2016	2016	12	art	Angels are everywhere in the Mu?iz family's apartment in the Bronx: paintings of angels on the wa
17298	Emma G. Fitzsimmons	2/1/2017	2017	1	business	Finally, The Second Avenue subway opened in New York City on Sunday, with thousands of riders
17311	Carl Hulse	3/1/2017	2017	1	business	WASHINGTON ? It's or time for Republicans. After a tumultuous decade that has seen profour
17339	Jim Rutenberg	5/1/2017	2017	1	business	For Megyn Kelly, the shift from Fox News to NBC ? where she will host a daily daytime show and
17340	John Koblin and Michael M. Gry	4/1/2017	2017	1	business	Megyn Kelly's new office at NBC News sits a block north of Fox News headquarters in Midtown M
17342	Farhad Manjoo	5/1/2017	2017	1	business	In the technology industry, the sharks have never long been safe from the minnows. Over much of
17344	Chris Buckley and Adam Wu	5/1/2017	2017	1	business	BEIJING ? A city official in southwest China unleashed a barrage of gunfire on the city's mayor a
17346	Beverly Gage	7/1/2017	2017	1	business	Our new president is a billionaire Ivy League graduate, a real estate tycoon, a TV star and a son c
17284	Benjamin Mueller and Al Baker	19/6/2017	2017	6	crime	After the bullet shells get counted, the blood dries and the votive candles burn out, people peer d

Fig. 2. Partial data from the original new_dataset.csv.

id	article
17889	The death rate from cervical cancer in the United States is considerably higher than previously estimated and the disparity in death rates
18260	SEOUL, South Korea " The chief of North Korea's powerful secret police, long considered the man for the top leader, Kim has been dismi
17823	One night nearly 140 years ago, Samuel Clemens told his young daughters Clara and Susie a bedtime story about a poor boy who eats r
17725	A former contestant on "The Apprentice" who accused Donald J. Trump of sexual assault during the presidential race filed a lawsuit again
17573	KABUL, Afghanistan " Abdul Ali Shamsi had already covered a lot of ground before he moved to Kandahar Province to become deputy g
18384	If you need a distraction from fighting about "La La Land," cheering at "Hidden Figures" or weeping about "Moonlight" " all of which might
17596	WASHINGTON " Ben Carson, the nominee for secretary of housing and urban development, presented himself on Thursday as a credibl
18252	The Metropolitan Opera's new production of Dvorak's "Rusalka" may be the unlikeliest hit of the season, a staging that takes opera's ans
17663	HAVANA " And's Iv?yn and his girlfriend grew up in Cuba but had long planned their future in the United States. She left four months ago
17335	LOS ANGELES " Girding for four years of potential battles with Donald J. Trump, Democratic leaders of the California Legislature announ
17813	WASHINGTON " Donald John Trump was inaugurated as the 45th president of the United States on Friday, ushering in a new era that he

Fig. 3. Partial cleaned data for Article Database

To expedite testing, I used a random sample of 100 articles from the cleaned dataset as my validation set. Using ChatGPT 4.0, I generated one question-and-answer pair for each of the 100 articles, with some of the data displayed in Fig. 4, the complete set of question and answer pairs for the validation set is included in the appendix. Finally, I transformed the data to align with the structure of the SQuAD 1.1 dataset.

2.2 Tokenization

In this paper, I set up tokenizers for both the training set and the validation set. A common approach used for both sets involves concatenating the question and context into a single string. The tokenizer then converts this text into numbers which serve as inputs for a BERT model. However, due to BERT's limitations on text length, and the extensive length of text in both training and validation sets, the first step involves splitting the text into smaller segments. To prevent answers from being cut across two segments, an overlapping strategy is employed where

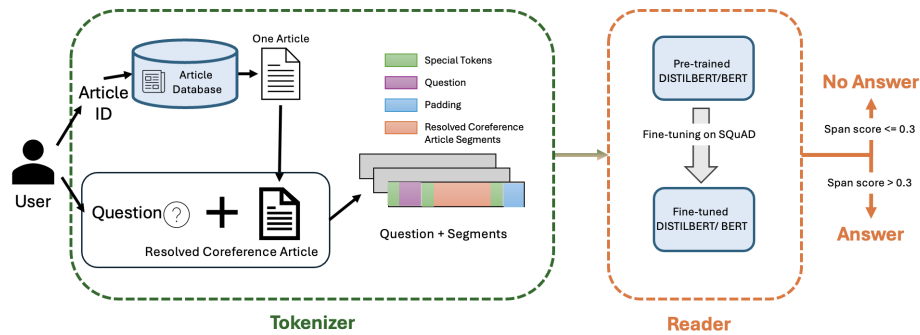


Fig. 5. Presents the system architecture. Source: created by myself

4.1 Coreference Resolution

The challenge of coreferencing within text, where different expressions refer to the same entity, often creating ambiguities that can impact the accuracy of model predictions. To address this, in this paper, Coreference Resolution (CR) techniques are applied to identify and replace anaphors or cataphors in articles with their original referring entities. This preprocessing significantly reduces ambiguities in paragraphs, providing the BERT model with clearer, more direct information. An example from the Validation set by using the FastCoref toolkit is presented [5]:

Paragraph:

... But this study said that the gap was far greater than believed...

Resolved Coreference:

...But a study published Monday in the journal Cancer said that the disparity in death rates between black women and white women was far greater than believed. ...

In the example provided, substituting the pronoun 'this study' with the specific noun phrase 'a study published Monday in the journal Cancer,' and replacing 'the gap' with 'the disparity in death rates between black women and white women,' enhances clarity by reducing ambiguity. As a result, both the question and the revised article text are combined into a new input sequence, which is subsequently used for training the BERT model.

4.2 BERT and DistilBERT

BERT (Bidirectional Encoder Representations from Transformers) is a transformative model based on the Transformer architecture, which uniquely provides context-aware bidirectional representations by conditioning on both left and right contexts within a sentence [6]. The encoders consist of a multi-head attention layer followed by a feed-forward network. Google released a pre-trained

BERT model in 2018, which has been widely applied across various domains through fine-tuning with labelled data [3].

There are two primary BERT architectures, BERT-Base and BERT-Large, which differ in the size of their network layers and dimensions. BERT-Base consists of 12 layers, with 768 hidden dimensions, 12 attention heads, and a total of 110 million parameters [2]. Due to BERT’s computational complexities [8], a derivative model called DistilBERT has been developed [7]. DistilBERT is smaller, faster, and lighter than the original BERT model, retaining most of its predecessor’s accuracy while being more efficient.

In this paper, the pre-trained BERT and DistilBERT models in Fig. 6 are used as part of the reader module.

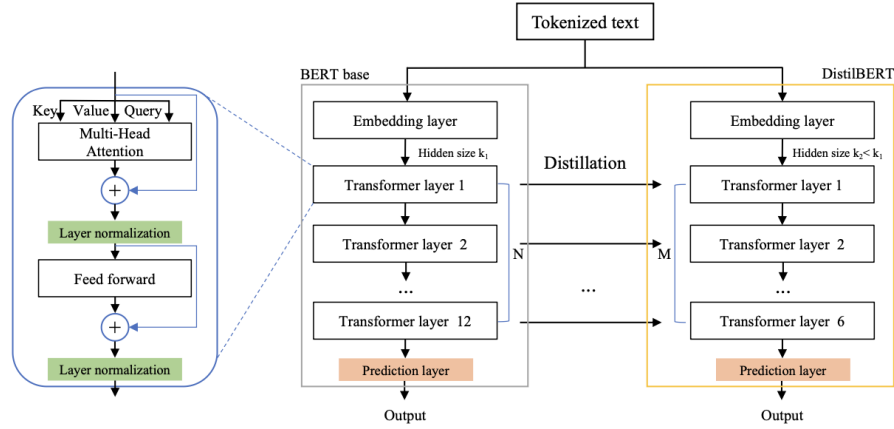


Fig. 6. The BERT-BASE and DistilBERT model architecture and components [9].

4.3 Evaluation Metric

In this paper, the performance of models is evaluated by two metrics: Exact Match (EM) and F1 score [6]. Both EM and F1 scores are computed for individual question-and-answer pairs and then averaged across all instances to obtain the overall performance of the model.

Exact Match (EM) is a strict metric where a score equals 1 if the model’s prediction is exactly the same as the True Answer; otherwise, the score is 0. EM is ideal for evaluating concise factual answers but is less effective for assessing longer answers.

F1 score, on the other hand, provides a more flexible evaluation by analyzing the individual words in the model’s prediction compared to those in the True Answer. It calculates precision as the proportion of correctly predicted words

relative to the total words in the prediction, and recall as the proportion of correctly predicted words relative to the total words in the True Answer. Displayed equations are centered and set on a separate line.

$$F_1 = 2 \times \frac{\text{precision} \times \text{recall}}{\text{precision} + \text{recall}} \quad (1)$$

4.4 Training

Experiments were conducted on Google Colab using the A100 GPU hardware accelerator platform. I fine-tuned both the pre-trained BERT-base-uncased model, which consists of 12 layers of Transformer blocks each with 12 attention heads and 768 hidden units, and the DistilBERT-uncased model, which includes 6 transformer layers, 768 hidden units, and 12 attention heads, on the SQuAD 1.1 training set.

The learning rate was set to 2×10^{-5} . The models were optimized with the Adam optimizer, and the loss parameter was set to `sparse_categorical_crossentropy`. Both models underwent training for three epochs. The tokenized question and article segments were processed by the AutoTokenizer library to split into tokens and map to their indexes.

After fine-tuning, the models were applied to the validation set, and I report the evaluation results in Table 1. The predictions of answers for the entire validation set questions are detailed in the appendix.

Table 1. Evaluation results on Validation set.

Models	Exact Match	F1 score	Training runtime
BERT-base	46	66.22	2085s (19min)
DistilBERT	45	62.62	1152s (31min)

According to the results presented in the table, BERT-base significantly outperformed DistilBERT in the answer span prediction task, with improvements of 3.6 points in F1 score and 1 point in exact match over DistilBERT. However, the training runtime for BERT-base was 1.5 times longer than that for DistilBERT. Given its superior accuracy in answer prediction, BERT-base was selected as the preferred model for the Reader module in my QA system.

5 User interaction and System evaluation

I developed a QA system based on the selected model, which operates as follows: Users first input an article ID they want to inquire about. If the user input is not a numeric ID, the system prompts that the input is an "invalid ID." If the user's input corresponds to an article ID not found in the database, the system informs the user that the ID cannot be found. If the ID is valid and present in the

article database, the system retrieves the corresponding article and the Reader module of the system will extract an answer with a confidence span score. If the score is below 0.3, the system notifies the user that there is no answer; if the score exceeds 0.3, then provides the answer. The system session terminates when the user types "quit." Fig. 7 illustrates a user session, showcasing the system’s practical testing.

From the example of the user session, it is evident that the system can execute commands across various user scenarios. When users interact with the system, they receive prompts to guide their next actions and can enter 'quit' at any time to exit the system. Additionally, for simple and straightforward factual questions, the system can provide relatively accurate answers, as demonstrated in the 3rd input example. For completely unrelated questions, the system will inform the user that a reliable answer cannot be found, as shown in the 4th input. However, when questions about terms that appear in the article are asked, which the article itself cannot answer, the system may provide incorrect responses, as illustrated in the 5th input.

6 Conclusion

This paper proposed a question-answering system for a specific news article dataset. The SQuAD 1.1 dataset was used to fine-tune the pre-trained BERT model and DistilBERT model. After randomly selecting a sample of 100 news articles from the news database, I generated a question-answer pair for each article by ChatGPT 4.0 to serve as my validation set for evaluating the performance of the two models. Due to the size limitations of the BERT model, I split the articles into segments and set overlaps to prevent truncation of answers, also ensuring the same segment sizes through padding. Additionally, I incorporated a Coreference Resolution technique in the validation set’s tokenizer to reduce ambiguities in the articles. While the training runtime of the BERT-base model was 1.5 times longer than that of the DistilBERT model, it performed better on the validation set with an exact match score of 46/100 and an F1 score of 66.23. Our system ultimately includes a Tokenizer module with Coreference Resolution and a Reader module with fine-tuned BERT-base model. User tests on my system showed smooth interaction and accurate answers to straightforward questions.

It is worth noting that when the system is presented with questions about words appearing in the articles that it cannot answer, it may provide incorrect responses. Further improvements are needed in our Reader module, such as considering the use of news-related datasets containing question-answer pairs for fine-tuning our existing models or exploring alternative models for extracting answers. Additionally, our system currently requires users to input an article ID to make inquiries; future work could enhance the system to allow users to simply pose questions, with the system autonomously determining the relevant article for the answer.

References

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1st Input: Invalid Article ID	
System Initialise	"Please enter the article ID or type 'quit' to exit:"
User Input	article 0000
System Output	"The article ID is invalid." "Please enter the article ID or type 'quit' to exit:"
2nd Input: Incorrect Article ID	
User Input	0000
System Output	"Article ID not found in the database." "Please enter the article ID or type 'quit' to exit:"
3rd Input: Correct ID with relevant question	
User Input	17460
System Output	"Please enter your question or type 'quit' to exit:"
User Input	What time was the text message sent on Nov.2?
System Output	"Answer: 6:25 a.m. (Confidence: 0.50)" "Please enter the article ID or type 'quit' to exit:"
Article segments	"...Ms. Vazquez smiled as she scrolled through those daily morning texts. At 6:25 a. m. on Nov. 2: "Rise Shine Scholars. The grind continues. "..."
4th Input: Correct ID with irrelevant question	
User Input	17460
System Output	"Please enter your question or type 'quit' to exit:"
User Input	Where is the university of Adelaide?
System Output	"No answer found with sufficient confidence." "Please enter the article ID or type 'quit' to exit:"
5th Input: Correct ID with relevant question	
User Input	17460
System Output	"Please enter your question or type 'quit' to exit:"
User Input	Where is NewYork?
System Output	"Answer: Brooklyn (Confidence: 0.43)" "Please enter the article ID or type 'quit' to exit:"
Article segments	"...Brooklyn High School for Leadership and Community Service in Clinton Hill, which is operated by Brooklyn Community Services, one of eight organizations supported by The New York Times Neediest Cases Fund. Leadership, one of 57 transfer schools in New York ..."
6th Input: Quit	
User Input	quit
System Output	"Exiting system."

Fig. 7. An example of user session of Question answering system.

id question

17889 What is the disparity in cervical cancer death rates between black women and white women in the U.S.?

18260 Who was dismissed in North Korea for corruption and abuse of power?

17823 What unique ability does the boy gain in the bedtime story told by Mark Twain?

17725 Who filed a defamation lawsuit against Donald J. Trump?

17573 What political movement did Abdul Ali Shama help found in Afghanistan?

18384 Who directed "Pearl Cider and Cigarettes"?

17596 What did Mr. Carson's granddaughter wear?

18252 Who presides over the meadow in the scene?

17663 Where did Miguel Alberto Escalona send a text from?

17335 By how many votes did Hillary Clinton defeat Mr. Trump in California?

17813 What did the crowd chant when Mrs. Clinton arrived?

17460 What time was the text message sent on Nov. 2?

18426 How many new investigators has the department identified?

17697 How long was Mr. Zinke acting commander according to General Repass?

18429 Who was blamed for the death of Mikhail Tolstoykh?

17449 Who styled many of Ms. Harris's looks over the past year?

17413 What have regulators and Olympic officials defended about the athletes?

17342 Who was the F.C.C. chairman before Tom Wheeler?

17990 How long has David Witt been Venus's coach and hitting partner?

18177 What does Windrip fail to restore?

18128 What did Kim say about the missile program's progress?

17847 What did Ms. Lawson make for Destiny's Child to wear?

17988 What percentage of LaGrange's population is black?

17864 Who is the nominee for education secretary mentioned in the text?

17800 How many stores, offices, and warehouses were in the building according to Ibrahim Najaf?

17431 What was the main criticism of the shorter workday experiment?

17418 How many people died in 2015 from crashes involving a distracted driver, according to the National Highway Traffic Safety Administration?

18042 Which airlines stopped allowing their pilots to board their planes?

17978 Who emphasized the need for the President to use a secure device?

17732 What did Lee, a venture capitalist, say the world needs now?

18364 What companies does CKE Restaurants hold?

18144 Where was the Syrian man blocked from flying to the U.S.?

18174 What is the core belief of those who oppose the fiduciary rules?

17873 What does Perry Link say the legitimacy of rulers in China depends on?

17767 Which organization provides a temperate analysis independent of governments?

17609 How many American soldiers were killed during the operation in Kunduz?

17384 What issue does the author use personal stories to highlight?

18147 What high-profile case did Ms. Yates lead the prosecution against?

18320 What did Mustafa buy to prepare for his new life?

18007 What percentage of the United Nations' regular budget is provided by the United States?

18323 Where is Raf Simons's label now based?

18116 How many students from the seven banned countries are estimated to be at American universities?

17296 How fast was the train traveling when it hit the end of the tracks at Atlantic Terminal?

17410 What persona did the GRU create to release DNC emails?

17400 What does the research suggest about the relationship between crime rates and urban movement?

17665 What tax did Mr. Spicer suggest to fund the border wall?

17822 What area is the source of most drinking water for Damascus?

17313 What did Hope Hicks do regarding requests for more detail on torture discussions?

17824 How much did the car rental near Melbourne Airport cost before insurance?

18460 Where do whale strandings frequently occur in New Zealand?

18139 How long do the meetings with senators typically last, according to Stephen Wermiet?

17287 When will Mr. Trump be sworn in as President?

18034 What accessory did Pierpaolo Piccioli use for his designs at Valentino?

17289 What stance did Ms. Tsai express Taiwan would take in response to Beijing's actions?

17466 How much did Trump win by in Tina Gunaldo's parish?

17826 Where was Mr. Barrow's inauguration held?

18336 What is the title of Judge Neil M. Gorsuch's book that discusses assisted suicide and euthanasia?

18075 Who led the charge to evict the Islamic State from Tielt in April 2015?

17865 What companies did Cellectis collaborate with before starting Calyxt?

18103 Why did Ms. Rivera hesitate to have her sons join her?

17648 What did President Obama focus on in his eulogy instead of guns?

17669 What role has Mr. Holder taken in the fight against gerrymandering?

17757 What did Ms. Kakuy say about the workload for Rockettes during the Christmas show?

18160 When did the Boy Scouts ease restrictions on gay youths?

18264 What was the condition of the licenses of the organizations operating the facilities?

18254 What did anarchists denounce along with NATO?

17838 What did Mr. Trump focus on during his first days in office?

18258 How much did the suspect pay for the apartment rental in Paris?

17911 What did Democrats believe Senate Republicans might choose to eliminate?

17345 How many murders were primarily motivated by drugs in 2016 according to the NYPD data?

18135 Where do the book club meetings take place?

17727 What percentage of Washington D.C.'s population was black during the time the passage refers to?

17572 What weather conditions did Mr. Kornspun describe in his message?

18422 What organization's volunteers accompanied Ms. Rayos to the ICE building?

17830 What instrument did Tom play in the stage act?

17366 What does "Lado B" translate to in English?

17515 How much would construction costs be for the new museum as mentioned?

18283 What humorous comparison did the patient make about Dr. Fajgenbaum?

17682 What ranking did Pro Football Focus give the Cowboys' offensive line?

18033 How did the grandmother react to the narrator's estimates about the woodpile work?

17568 Where did the lunch happen?

18171 Why did Ban Ki-moon decide not to run for the presidency of South Korea?

18191 What did the town attorney lecture Ms. Herbst about?

18192 How much were Mr. Fallon's children reportedly paid as parliamentary aides?

18408 Who wore the Prada dress to the Oscars that marked a milestone in fashion?

18455 How many attacks did the White House claim were uncovered by the media?

17637 How much did Senator McCain win his state by, according to his statement?

18268 When did Bulgaria join the European Union?

17960 What caused the book sales to increase over the weekend?

17910 What were the two types of fish most frequently misidentified according to the study?

18540 What university is Cody Grissom attending?

17511 Which celebrity's mishap did Mr. Fallon reference after the break?

17899 Who became the director of operations for the players' association last May?

18413 Which two publications were repeat winners for general excellence?

17770 Who did George H. W. Bush reportedly plan to vote for in the last presidential election?

18069 What cautionary advice did Mr. Cranston say he would whisper?

17945 What did Mary Tyler Moore apologize for in advance?

17963 How much track does China's rail network cover?

17591 Who heard about the dossier in July?

17473 What was Pharrell Williams actually nominated for?

answer

Significantly wider

The chief of base of secret police

Talk to animals

Summer Zervos

Afghanistan 1400 youth political movement

Robert Valley

pink headphones

Vodnik

in a park in Vedado

more than four million

Lock her up

625 a. m.

75 new investigators

about a week and a half

Rebel officials blamed Ukraine

Ms. Singer

followed proper procedure

Mr. Genachowski

10 years

prosperity

final stage

Boy Scout uniforms, camouflage hot pants

48 percent

Betsy DeVos

590

high price tag

more than 3,400

Emirates, Lufthansa and Qatar Airways

Senator Ron Wyden

strong leaders

Carl's Jr. and Hardee's

from Abu Dhabi

People ought to bear more responsibility

an immaculate record

Berkeley Earth

Two American soldiers

police brutality

Eric Robert Rudolph

dark green pants, a vest, a checked shirt

22 percent

New York

about 17,000

more than 10 miles per hour

GucciHer 2.0

falling crime has a comparable effect

20 percent tax on imports from Mexico

Wadi Barada

declined requests

44 Australian dollars

Fairwell Spit

15 minutes to an hour

Jan. 20

flat sandals

will not bow to pressure

more than 50 points

Gambian Embassy in Dakar, Senegal

The Future of Assisted Suicide and Euthanasia

Shire Muslim militias

Monsanto and DuPont Pioneer

fear of the perilous journey

meaning of grace

campaigning

six months' worth of work

in 2013

invalid licenses

World Trade Organization

health care

\$1,830

Ribchester power

29

Bridge End Inn, Talgarth

49 percent

heavy rain and melting snow

Puente volunteers

guitar

8 Side

\$150 million to \$180 million

a mother hen

the best in the league

raise a steely eyebrow

mouth of Gotham's Cave

disappointed by outdated and egotism among some politicians

laws that govern elections and canvassing

over \$90,000

Uma Thurman

78

by 14 points

2007

Kellyanne Conway, an adviser to Donald J. Trump, gave on 'Meet the Press.

Halbut and red snapper

Purdue University

Mariah Carey's singing disaster

Terri Carmichael Jackson

Bon Appetit and ESPN's Magazine

Hillary Clinton

Just don't piss in the soup

a watery eye

12, 500 miles

Rich Wilson

best original score