# A Mixed-Method Analysis of Text and Audio Search Interfaces with Varying Task Complexity



Sasha Vtyurina



University of Waterloo

**Charlie Clarke** University of Waterloo



Edith Law

University of Waterloo



Horațiu Bota

Johanne Trippas University of Melbourne





### • Correct answer exists

- Direct and concise
- o Single source needed

Second and the second second





en arkipedia orginiski - Colden, Rahrever Golden Retriever - Wikipedia The Garden Retriever is a medium targe gun dog that was bred to retrieve shut waterfoot, such as ducks and uptand game birds, during hunding and shooting parties. The name "retitieve s to the breed's ability to redreve shot game undamaged due to their soft mouth Russian tracker - Bits Inhibition - Tweed Water Spanist - Hemanglosancoma

www.aho.org - Dog Breeds Golden Retriever Dog Breed Information Air 8, 2020 - The Datlan Ratriever, an exclusion Scotleth surded of great beauty stands. among Americans most popular dog breeds. They are serious ... 10 Things To Know About ... - Golden Retriever Pschures - Sporting Droup

Golden Retriever Dog Breed Profile | Petfinder earn more about the Garden Retriever timed and find out if this Dog is the right fit for your tone at Pethoder

wowned-reducery corr - Dec Breed Review Golden Retrievers: What's Good About 'Em, What's Bad About ... Golden Retrievers: What's Gold About Tim, What's Bad About Tim. Golden Retriever temperament, personality, Farring, Sehavior, prox and cons, advice, and ... Oction Refraver Buging ... - Oction Retrever Health - Oction Retrever Training

www.httppst.com - Dep Care, What's New? Golden Retriever Dog Breed - Facts and Traits | Hilfs Pet The golden retriever was tred to be a tind dog, particularly for hundrig water fow, and th breed resulted from crossing a number of other breeds thought to ...

5 Things You Should Know before Getting A Golden Retriever. Aug 7, 2019 - Galden Retrievers are some of the most popular docs both in the US and worldwide, thanks to their beautiful appearance and their roce.

Top stories

Google

golden retriever

Golden Reinlever Informatio

Weight 55 to 78 pounds

People also ask



More for golden retriever





Searches related to golden retriever

Q, english golden rebiever golden retriever puppy Q, golden retriever facts. O, golden retriever temperament 9. golden retriever for sale golden retriever shedding d, canadian golden retriever Q, golden retriever colors



### Search Engine Results Page (SERP)



Golden Retriever

Dog breed

The Golden Retriever is a medium-large gun dog that was bred to retrieve shot waterfowl, such as ducks and upland game birds, during hunting and shooting parties. The name "retriever" refers to the breed's ability to retrieve shot game undamaged due to their soft mouth. Wikipedia

Life expectancy: 10 - 12 years

Weight: Female: 25-32 kg, Male: 30-34 kg

Temperament: Intelligent, Kind, Reliable, Trustworthy, Confident, Friendly

Height: Female: 51-56 cm, Male: 56-61 cm

Colors: Cream, Dark Golden, Light Golden, Golden

Origin: United Kingdom, Scotland, England

#### People also search for

Husky

Labrador

Retriever



Siberian



Beagle Rottweiler

Feedback

Pug

View 15+ more

<



exception any enter - bottom, Patrimer - Coldref Retriever - Wilkpelde Tord dates Retriever as a reductivity put day test best bretter brittenet durit testefund, such as data and agrican gene tests, dange dage and during pates. The same frederese refers to the seek addity to testes while gener underaged due to the early instance. Recent tester - Retriever and Patrimer Advances and Patrimer tests to the seek addity to testes while Species - Hermaged due to the early manual Recent tester - Retriever and Patrimer - Retriever and testes - Retriever - Retriever - Retriever tests to the retriever - Retriever - Retriever - Retriever retriever - Retriever - Retriever - Retriever retriever - Retriever

was also up : Dog Break -Golden Retriever Dog Bread Information April 200: The balan Retriever, an autorent Sustein pursing of great lands, stards aroung Annual and public dig break. They are senses -10 thing in Submall - Caladre Annuerer Publics - Sports Disco

exempetitude.com - Dag threads -Goldom Retriever Dog Bread Phofile | Petituder Learn none atout the Goldon Retriever bread and third out this Dog is the right to for your low-ad Pretriever

new populatingupg care: Dag their Review -Coldern Retrievens: What's Good About "Erm, What's Bad About ... Outles Retrievens: What's Good About "in, Mark I las About "in- Galden Retrieven tergenerest; personality: Tarray, service; pers and core, abole, and ... Oaken Retrieven things ... O colder Roteneer Health - Galden Retriever Training

executepation - bag bars. White level - -Golden Retriever Dog Breed - Facts and Traits | Hilfs Pet The golden retriever was that to be also dag, particularly for hunting water first, and the bread example from dowing a marker of other trends through to ...

Top stories

Google



→ More for golden retriever





Searches related to golden retriever

Q, golden retriever puppy	Q, english golden rebiever
O, golden retriever facts	Q. golden retriever temperament
9. golden rebriever for sale	<ol> <li>golden retriever shedding</li> </ol>
Q, canadian golden retriever	Q. golden retriever colors

### Search Engine Results Page (SERP)



People a	lso ask	
What are the	ne 3 types of golden retrievers?	~
Are Golder	n Retrievers good family dogs?	~
Is Golden I	Retriever dangerous?	~
How much	is a golden retriever puppy?	~
	Feedba	ck
	Colors: Cream, Dark Golden, Light Golden, Golden	
	Origin: United Kingdom, Scotland, England         People also search for       View 15+ more         Image: Description of the second	

Feedback

Gooooooogle



enanopada un i en collecti, detteur -Collectin Relative - Millopeda The dealer Relative II a median range pri dig that was bed to relate edit and ethol a deale and space to the collecting and should gates. The same traditioner relation is to teach addity to tellere and game unbranged due to the soft much. Research taken - Relations - Teac of the Source - Hermanisations

was also up a log tenso. -Golden Retriever Dog Breed Information April 2000: Ine blacks Nationer, an excent Statistic public of practiced, starta aroung Annual Versite (and dig breed). They are antices -10 They to Science Mault - Outdate Informer Places- Spectra (Deep 1996).

exexpetitions can a bag trease in Golden Retriever Dog Bread Profile | Petitinder Learn nore about the Golden Monreer bread and the out this bog is the right till by your home at Petitian!

nem porportendpuppi ceni - Dag tread Reverse -Golden Retrievens: What's Good About "Em, What's Bad About ... Orders Retrieven: What's Good Robust Ten, What's Bad About ... Orders Retrievent, presentative, Tenny, Selbarder, priva and ceni, abola, et al. Goaden Retrievent they - Orders Retriever Heath - Goaden Retriever Yoring

executepetcore: Dag Care: What Keet? -Colden Retriever Dog Breed - Facts and Traits | Hilfs Pet The geteen retriever was that to be add, particularly for functing water fact, and the treed restance from cleaning a number of other treests through the ...

Top stories



More for golden retriever





Searches related to golden retriever

<ol> <li>golden retriever puppy</li> </ol>	Q, anglish golden rebiever
Q, golden retriever facts	Q, golden retriever temperament
<ol> <li>golden retriever for sale</li> </ol>	<ol> <li>golden retriever shedding</li> </ol>
Q canadian golden retriever	Q. golden retriever colors

Goooooooogle

### Search Engine Results Page (SERP)



Feedback



× Q

Weight Family 25-32 to Main 32-38 to Cream Date Golden, Light Golden, Gold 🔝 🎢 A 🛐 🛍

expedia.org - entri- Calcer, Refreser Onkton Retriever - Wikinedia The darban Retrieven is a medium large gun dog that was bred to retrieve shut waterfeet, such as ducks and uptand game binds, during hunting and shooting parties. The name "retrieven" tracker - Bits structure - Tweed Water Spanet - Hernangspaarcory

Google

poliden retriever

www.anc.org - Dog Breeds Golden Retriever Dog Breed Information Aprill, 2020 - The Dalidee Retriever, an exclusion Scotten punches of great g Americans most popular dog timeds. They are service

Index.com - Dog Breeds Golden Retriever Dog Breed Profile | Petfinder Learn more about the Galden Ratitever breed and find out if this Dog is the right fit for your

Golden Retrievers: What's Good About 'Em, What's Bad About ... Golden Retrievers: What's Gold About Tim, What's Bad About Tim, Gelden Retriever

Golden Retriever Dog Breed - Facts and Traits | Hilfs Pet he golden retriever was tried to be a tind dog, particularly for hunting water four, and

5 Things You Should Know before Getting A Golden Retriever . Aug 7, 2019 - Galden Retravers are some of the most popular docs both in the US and



More for colden retrieves





#### Searches related to golden retriever

Q, golden retriever puppy	Q, english golden rebiever
Q, golden retriever facts	Q, golden retriever temperament
<ol> <li>golden retriever for sale</li> </ol>	<ol> <li>golden rebriever shedding</li> </ol>
Q, canadian golden retriever	<ol> <li>golden retriever colors</li> </ol>

### Search Engine Results Page (SERP)

The Golden Retriever is a medium-large gun dog that was bred to retrieve shot waterfowl, such as ducks and upland game birds, during hunting and shooting parties. The name "retriever"

refers to the breed's ability to retrieve shot game undamaged due to their soft mouth

Apr 6, 2020 - The Golden Retriever, an exuberant Scottish gundog of great beauty, stands

Russian tracker · Bite inhibition · Tweed Water Spaniel · Hemangiosarcoma

among America's most popular dog breeds. They are serious ...

Golden Retriever Dog Breed Profile | Petfinder

10 Things To Know About ... · Golden Retriever Pictures · Sporting Group



#### www.akc.org > Dog Breeds \* Golden Retriever Dog Breed Information





Owher

Dodo

The Doc

5 Thing

Golden

www.yourpurebredpuppy.com > Dog Breed Reviews \*

#### Golden Retrievers: What's Good About 'Em, What's Bad About ...

Learn more about the Golden Retriever breed and find out if this Dog is the right fit for your

Golden Retrievers: What's Good About 'Em, What's Bad About 'Em, Golden Retriever temperament, personality, training, behavior, pros and cons, advice, and ... Golden Retriever Buying ... · Golden Retriever Health · Golden Retriever Training

#### YouTube www.hillspet.com > Dog Care: What's New? \*

en.wikipedia.org > wiki > Golden\_Retriever \*

Golden Retriever - Wikipedia

www.petfinder.com > Dog Breeds \*

home at Petfinder!

#### Golden Retriever Dog Breed - Facts and Traits | Hill's Pet

The golden retriever was bred to be a bird dog, particularly for hunting water fowl, and the breed resulted from crossing a number of other breeds thought to ...

animalso.com > breeds > golden-retriever \*

#### 5 Things You Should Know before Getting A Golden Retriever ...

Aug 7, 2019 - Golden Retrievers are some of the most popular dogs both in the US and worldwide, thanks to their beautiful appearance and their nice ...





× Q

en untryleda ung - kati - Datton, Thatewar -Gold en Retri kwer - Wirkspedia The disable Retrieves in antour rouge gan tog that was find to intriner end waterbark, as durks and uppen game bink, during hund hunding juntes. The same "intervent where to the benefit acting to interve during muricipated due to there and muruh. Russian truths- the Wirkshin- There during interventionaguestions

Google

poliden retrieven

new advage log log density - CColder Retriever Dog Brood Information April, 2001 - The Bosten Reserver, in ecutives builded guidag of great beauty, starts aroung Anestra's real point dig basis. They are series able to the grad Reserver and - - Calabe Retriever Pathers Styring Droop

exexpetitions on a big thread in a Golden Retriever Dog Bread Profile | Petitinder Learn non-abalities dealers Retriever bread and hid out three big is the right till for your toma abalities!

new posporation/pupy-cainer: Dag Terest Reviews -Coldeen Retrievens: What's Good About "Erm, What's Baid About ... Ondere Retrievens: Thrus Good Teol, War's Biot About Teo, Guiden Retrieven Incelenent, personality, Erming, Enforce (reach and caine, abolia, editolization Retrieven (fragma) - Colden Retrieven Handham Chailes Retrieven Straming

sees they can be been thank to were -Golden Retriever Dog Breed - Facts and Traits | Hilfs Pet The golden retriever was treat to be allord day, particularly for hurding water fixed, and it treat the solution form clearing a number of other breeds thought to ...

ensures can been systematical sectors of the sector of the







#### Searches related to golden retriever

Q, golden rebriever puppy	Q, english golden retriever
Q, golden retriever facts	Q, golden retriever temperament
9. golden retriever for sale	<ol> <li>golden retriever shedding</li> </ol>
0, canadian golden retriever	Q. golden retriever colors

### Search Engine Results Page (SERP)



en.wikipedia.org > wiki > Golden\_Retriever \*

#### Golden Retriever - Wikipedia

The Golden Retriever is a medium-large gun dog that was bred to retrieve shot waterfowl, such as ducks and upland game birds, during hunting and shooting parties. The name "retriever" refers to the breed's ability to retrieve shot game undamaged due to their soft mouth. Russian tracker - Bite inhibition - Tweed Water Spaniel - Hemangiosarcoma

#### Videos

### Top stories



### Facing Your Fears: Golden Retriever Puppy is Afraid of Sea Wave

Sputnik News · 1 day ago



#### Golden Retriever Forgets How to Bark

Sputnik News · 5 hours ago

#### → More for golden retriever





Goooooooogle



### - Alexa, tell me about golden retrievers.



- The Golden Retriever is a medium-large gun dog that was bred to retrieve shot waterfowl, such as ducks and upland game birds, during hunting and shooting parties. The name "retriever" refers to the breed's ability to retrieve shot game undamaged due to their soft mouth.



Instantiation or white Calobies whethere is a Coldrein Relatives — Winkspectra Instantiation of the Calobies and the Calobies and the state of the Instantiation of the Calobies and the Calobies and the Calobies devices the the the state of the Calobies and the Calobies devices the Calobies and the Calobies and the Calobies devices the Calobies and the Calobies and the Calobies devices the Calobies and the Calobies and the Calobies devices the Calobies and the Calobies and the Calobies devices and the Calobies and the Calobies and the Calobies devices and the Calobies and the Calobies and the Calobies devices and the Calobies and the Calobies and the Calobies devices and the Calobies and the Calobies and the Calobies devices and the Calobies devices

www.petinder.com - Dog Breeds -Golden Retriever Dog Breed Profile | Petinder Learn more stout the Garden Retriever Level and that out if this Dog is the right to fair yo home at Petindent

was porporteringupy circling iterat Network Golden Ristrievens: What's Good About "Em, What's Bad About. Galam Ristrievens: What's Good Ruot Tin, What's Bid About To during Network Inspacement, personally, terrang, Sethering part of circle, addition, et al. Galam Ristrieven (Emp). - Golden Ristrieven Pault- Golden Retrieven Tuming Calam Ristrieven (Emp). - Golden Ristrieven Pault- Golden Retrieven Tuming Calam Ristrieven (Emp). - Golden Ristrieven Pault- Golden Retrieven Tuming Calam Ristrieven (Emp). - Golden Ristrieven Pault- Golden Ristrieven Tuming Calam Ristrieven (Emp). - Golden Ristrieven Pault- Golden Ristrieven Calama Ristrieven (Emp). - Golden Ristrieven Pault- Golden Ristrieven (Emp).

eximplectory in the Date Wark New? olden Retriever Dog Breed - Facts and Traits | Hilfs Pet epideminities was test to be a too day, percusely to huming water toor, and the ed resulted toor covering a number of other trends thought to ...

mana.com is tended upblemetheum -Things You Should Know before Cetting A Golden Retriever ... (2) 7211 - Gulden Retrieves as where of the most papara days both in the US and rateds, there is then beautiful appearance and then rose ...



More for golden retriever





Searches related to golden retri-

 golden netriver puppy
 q. english golden netriver

 golden netriver facts
 q. golden netriver temperament

 golden netriver for sale
 q. golden netriver stedding

 canadian golden netriver
 q. golden netriver colors

Goococococogle

en.wikipedia.org > wiki > Golden\_Retriever \*

#### Golden Retriever - Wikipedia

The Golden Retriever is a medium-large gun dog that was bred to retrieve shot waterfowl, such as ducks and upland game birds, during hunting and shooting parties. The name "retriever" refers to the breed's ability to retrieve shot game undamaged due to their soft mouth. Russian tracker · Bite inhibition · Tweed Water Spaniel · Hemangiosarcoma

#### www.akc.org > Dog Breeds \*

#### Golden Retriever Dog Breed Information

Apr 6, 2020 - The **Golden Retriever**, an exuberant Scottish gundog of great beauty, stands among America's most popular dog breeds. They are serious ... 10 Things To Know About ... · Golden Retriever Pictures · Sporting Group

www.petfinder.com > Dog Breeds \*

#### Golden Retriever Dog Breed Profile | Petfinder

Learn more about the Golden Retriever breed and find out if this Dog is the right fit for your home at Petfinder!

www.yourpurebredpuppy.com > Dog Breed Reviews \*

### Golden Retrievers: What's Good About 'Em, What's Bad About ...

Golden Retrievers: What's Good About 'Em, What's Bad About 'Em. Golden Retriever temperament, personality, training, behavior, pros and cons, advice, and ... Golden Retriever Buying ... · Golden Retriever Health · Golden Retriever Training

www.hillspet.com > Dog Care: What's New? \*

#### Golden Retriever Dog Breed - Facts and Traits | Hill's Pet

The **golden retriever** was bred to be a bird dog, particularly for hunting water fowl, and the breed resulted from crossing a number of other breeds thought to ...

animalso.com > breeds > golden-retriever \*

#### 5 Things You Should Know before Getting A Golden Retriever ...

Aug 7, 2019 - Golden Retrievers are some of the most popular dogs both in the US and worldwide, thanks to their beautiful appearance and their nice ...

How can we present SERP through a voice-only channel?

### Plan



6 search tasks



Search results from Google Search API Two interfaces: Audio and Text ))



Two studies: AMT and LAB

# Plan Two interfaces: Search results from 6 search tasks Audio and Text Google Search API



Two studies: AMT and LAB



_	Dimension	Definition	
2 X	Remember	Retrieving, recognising, and recalling relevant knowledge from long-term memory.	
2 X	Understand	Constructing meaning from oral, written, and graphic messages through interpreting, exem- plifying, classifying, summarising, inferring, comparing, and explaining.	
-	Apply	Carrying out or using a procedure through exe- cuting or implementing.	
2 X	Analyse	Breaking material into constituent parts, deter- mining how the parts relate to one another and to an overall structure or purpose through dif- ferentiating, organising, and attributing.	
-	Evaluate	Making judgments based on criteria and stan- dards through checking and critiquing.	
	Create	Putting elements together to form a coherent or functional whole; reorganising elements into a new pattern or structure through generating, planning, or producing.	

How tall is CN tower in Toronto?
Which planet was researched by spacecraft Magellan?

o ... health and benefits of seaweed and algae...
o ... scientific expeditions in Antarctica...

o ... Hubble telescope achievements..

o ... new hydroelectric projects...



6 search tasks



Search results from Google Search API

Two interfaces: Audio and Text



Two studies: AMT and LAB







6 search tasks

G

Search results from Google Search API Two interfaces: Audio and Text

))



Two studies: AMT and LAB



### 7/8: New Hydroelectric Projects

Exit task

You recently saw a news report about global warming which mentioned hydroelectric energy as a green alternative. This made you interested in finding out about new hydroelectric projects around the world: which countries are engaged in the construction of hydroelectric projects, and where are the projects located? What is their purpose, and what are possible problems or consequences?

A	Keeyask Generating Station - Manitoba Hydro https://www.hydro.mb.ca/projects/keeyask/ For more information on the Keeyask project, visit the Keeyask Hydropower Limited New sources of electricity are needed to maintain the reliable supply our
В	Site C Clean Energy Project - BC Hydro https://www.bchydro.com/energy-in-bc/projects/site_c.html The Site C Clean Energy Project (Site C) will be a third dam and Careers. We look for exceptional people to bring new ideas and fresh thinking to BC Hydro.
c	New Hydro Development Project & Hydropower Construction https://www.hydroworld.com/industry-news/ Read the hot hydroelectric plant news & upgrade information for hydro development projects.
D	New life for the dammed? Philly issues call for hydro-energy projects http://www.philly.com/philly/business/energy/new-life-for-the-dammed-philly-issues-call-for-hydro-energy-projects- 20171102.html The city is looking for ideas to harness the potential energy flowing through Philadelphia's waterways.
E	Zimbabwe promises new hydroelectric power project on the https://www.businesslive.co.za/bd/world/africa/2018-07-10-zimbabwe-promises-new-hydro-electric-power-project-on- the-zambezi-river/ Harare — Zimbabwe President Emmerson Mnangagwa has vowed to push ahead with a hydroelectric power project on the Zambezi River as



### In Depth | Magellan – NASA Solar System Exploration

https://solarsystem.nasa.gov/missions/magellan/in-depth/

NASA's real-time science encyclopedia of deep space exploration. ... Magellan was the first planetary spacecraft launched from the Space Shuttle. ... manifest into the 1990s, which included a number of planetary missions. ... A new study reveals asteroid impacts on ancient Mars could have produced key ...

In depth. Magellan - Nasa solar system exploration. From solarsystem dot nasa dot gov. Nasa's real-time science encyclopedia of deep space exploration. Magellan was the first planetary spacecraft launched from the Space shuttle. Manifest into the 1990s, which included a number of planetary missions. A new study reveals asteroid impacts on ancient Mars could have produced key.



### In Depth | Magellan – NASA Solar System Exploration https://solarsystem.nasa.gov/missions/magellan/in-depth/

NASA's real-time science encyclopedia of deep space exploration. ... Magellan was the first planetary spacecraft launched from the Space Shuttle. ... manifest into the 1990s, which included a number of planetary missions. ... A new study reveals asteroid impacts on ancient Mars could have produced key ...

In depth. Magellan - Nasa solar system exploration. From solarsystem dot nasa dot gov. Nasa's real-time science encyclopedia of deep space exploration. Magellan was the first planetary spacecraft launched from the Space shuttle. Manifest into the 1990s, which included a number of planetary missions. A new study reveals asteroid impacts on ancient Mars could have produced key.



### In Depth | Magellan – NASA Solar System Exploration https://solarsystem.nasa.gov/missions/magellan/in-depth/

NASA's real-time science encyclopedia of deep space exploration. ... Magellan was the first planetary spacecraft launched from the Space Shuttle. ... manifest into the 1990s, which included a number of planetary missions. ... A new study reveals asteroid impacts on ancient Mars could have produced key ...

In depth. Magellan - Nasa solar system exploration. From solarsystem dot nasa dot gov. Nasa's real-time science encyclopedia of deep space exploration. Magellan was the first planetary spacecraft launched from the Space shuttle. Manifest into the 1990s, which included a number of planetary missions. A new study reveals asteroid impacts on ancient Mars could have produced key.



### In Depth | Magellan – NASA Solar System Exploration https://solarsystem.nasa.gov/missions/magellan/in-depth/

NASA's real-time science encyclopedia of deep space exploration. ... Magellan was the first planetary spacecraft launched from the Space Shuttle. ... manifest into the 1990s, which included a number of planetary missions. ... A new study reveals asteroid impacts on ancient Mars could have produced key ...

In depth. Magellan - Nasa solar system exploration. From solarsystem dot nasa dot gov. Nasa's real-time science encyclopedia of deep space exploration. Magellan was the first planetary spacecraft launched from the Space shuttle. Manifest into the 1990s, which included a number of planetary missions. A new study reveals asteroid impacts on ancient Mars could have produced key.

### 6/8: Marine Vegetation

You recently heard a commercial about the health benefits of eating algae, seaweed and kelp. This made you interested in finding out about the positive uses of marine vegetation, both as a source of food, and as a potentially useful drug.

A	•
в	•
с	•
D	•
E	•

### Interfaces: Text and Audio

### 7/8: New Hydroelectric Projects

Exit task

You recently saw a news report about global warming which mentioned hydroelectric energy as a green alternative. This made you interested in finding out about new hydroelectric projects around the world: which countries are engaged in the construction of hydroelectric projects, and where are the projects located? What is their purpose, and what are possible problems or consequences?

	Keeyask Generating Station - Manitoba Hydro
	https://www.hydro.mb.ca/projects/keeyask/
<u>^</u>	For more information on the Keeyask project, visit the Keeyask Hydropower Limited New sources of electricity are
	needed to maintain the reliable supply our
	Site C Clean Energy Project - BC Hydro
	https://www.bchydro.com/energy-in-bc/projects/site_c.html
D	The Site C Clean Energy Project (Site C) will be a third dam and Careers. We look for exceptional people to bring new
	ideas and fresh thinking to BC Hydro.
	New Hydro Development Project & Hydropower Construction
С	https://www.hydroworld.com/industry-news/
	Read the hot hydroelectric plant news & upgrade information for hydro development projects.
	New life for the dammed? Philly issues call for hydro-energy projects
_	http://www.phillv.com/phillv/business/energy/new-life-for-the-dammed-philly-issues-call-for-hydro-energy-projects-
D	20171102.html
	The city is looking for ideas to harness the potential energy flowing through Philadelphia's waterways.
	Zimbabwe promises new hydroelectric power project on the
	https://www.businesslive.co.za/bd/world/africa/2018-07-10-zimbabwe-promises-new-hvdro-electric-power-project-on-
Е	the-zambezi-river/
	Harare — Zimbabwe President Emmerson Mnangagwa has vowed to push ahead with a hydroelectric power project on the
	Zambezi River as

### 6/8: Marine Vegetation

You recently heard a commercial about the health benefits of eating algae, seaweed and kelp. This made you interested in finding out about the positive uses of marine vegetation, both as a source of food, and as a potentially useful drug.



### Select results that you found <u>the best</u> for the task above, second best, and result that that you found the least useful.

Best result					
$\bigcirc$	$\bigcirc$	0	$\bigcirc$	$\bigcirc$	
Α	В	С	D	Е	
Second best result					
$\bigcirc$	$\bigcirc$	$\bigcirc$	0	$\bigcirc$	
Α	В	С	D	Е	
Least useful result					

0	0	$\bigcirc$	0	$\bigcirc$
Α	В	С	D	Е

Exit task

Continue



6 search tasks

G

Search results from Google Search API Two interfaces: Audio and Text



Two studies: AMT and LAB

## Two studies

Amazon Mechanical Turk (AMT)



- 69 participants
- Identify general trends
- USD 3.50 per task
- Choose best, 2<sup>nd</sup> best, and the least useful results



Laboratory study (LAB)



- 36 participants
- Develop deep understanding
- Choose best, 2<sup>nd</sup> best, and the least useful results
- NASA TLX
- Verbal interview



### Differences in overall ranking



Bootstrap average difference of correct selections between Text and Audio conditions



### Perceived workload



Text interface scores significantly lower on NASA TLX than Audio interface

### Qualitative observations



"The first one is Zimbabwe one, and... I think I clicked the Philadelphia one."

Navigation shortcuts

"The best one was the brief history one"

"I chose the NASA one as the best one, and then the one from "the weathernetwork" as the second best one"

"The best one was from a travel website"

## Qualitative observations



"I couldn't tell when it was going to stop... It's why Instagram videos suck — you can't see how far along you are in the video"

Uncertainty wrt duration



"It was very monotone, washing over me"

Monotonicity



Truncated

sentences

"This one on the ScienceDirect using algae and marine vegetation looked like it could have been promising, but then it cuts off, so not sure"



"The URLs and the sources they kind of like blended in to actual information"

"Just give me the name of the website, just say 'Wikipedia', just say 'NASA', whatever it was, I don't need the URL"



"He said the URL, or something like that, and then he repeated the title which was the exact same thing as the URL"

Repetitions

### Qualitative observations



"I had to carefully listen to the audio. And when I'm listening to audio, I feel like this is the only chance I'm listening to it"

Cognitive load

"I can browse through the results quicker visually. And I'm able to pick out key-words"

### Discussion

- Interface (Text or Audio) has a significant effect on the result selection and perceived workload.
- $\odot\ensuremath{\mathsf{We}}$  did not find an effect of the task complexity
- oA voice-based search system should:
  - $\circ$  be aware of the content it is returning
  - $\circ$  clearly indicate constituent parts
  - o use prosodic features to avoid monotone voice
  - $\circ$  avoid abbreviations
  - $\circ$  avoid repetition
  - $\ensuremath{\circ}$  avoid truncated sentences

# A Mixed-Method Analysis of Text and Audio Search Interfaces with Varying Task Complexity



Sasha Vtyurina



University of Waterloo

**Charlie Clarke** University of Waterloo



Edith Law

University of Waterloo



Horațiu Bota

Johanne Trippas University of Melbourne