

NLP based video tagging and captioning using audio

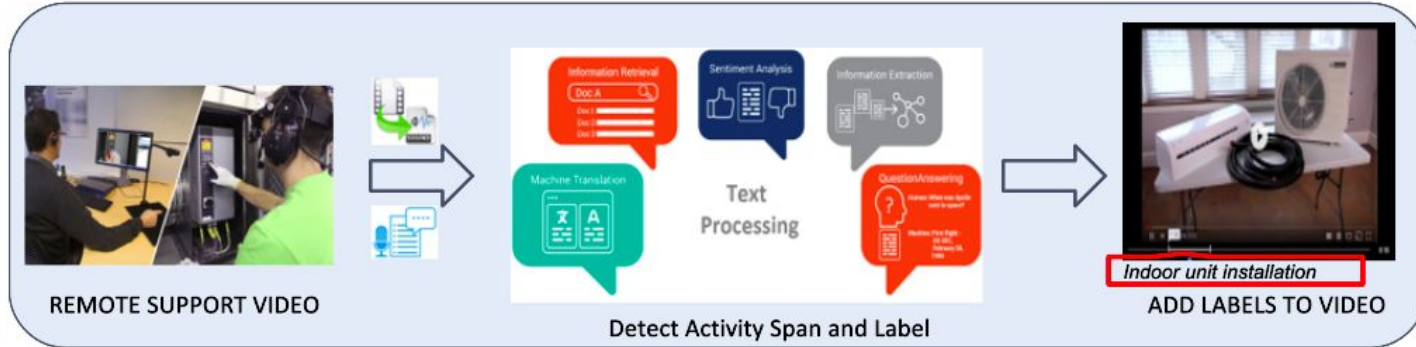
TIC DigiNavi group

Manas Jain (Mentor - Vansh)

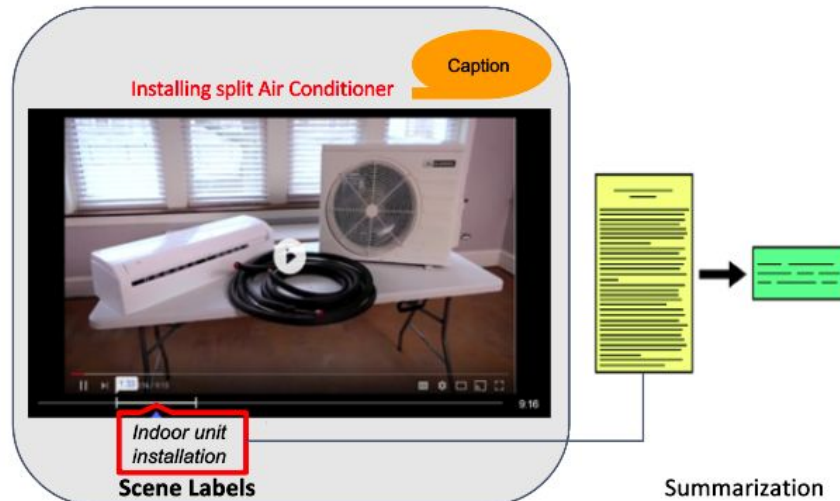


Theme 4:

Problem Statement: *Video tagging and Captioning using audio in collaboration with THEME 3*



Video Captions



Scene Labels

Summarization

	file_name	transcripts	word_count	duration	tags	rake_keyphrase
7	videoplayback-Scene-003.mp3	Today, I've got an overheated compressor went ahead and pulled my disconnect discharge the cap got a dangling to Pastor there got a video on how to secure that make that better. I got ice on the compressor to cool it down cleaning and my catfish in is that it's the hard start kit that the gun out on this I can see it very much discolored already discharged my run cap, but since I'm here, I'm g...	94	28.943673	[cap, compressor, hard, start]	[much discolored already discharged, overheated compressor went ahead]
3	videoplayback-Scene-004.mp3	Louis. I find the yellow one goes to one side and a blue and red on the other side service Pastor my particular unit.	24	26.697143	[side]	[yellow one goes, side service pastor]
14	videoplayback-Scene-005.mp3	pastors pretty hot This one's got blue and red on one side and yellow on the other side. Exeter scrap down find a good place to flip this on. I work there. Hard start kit now fired up if it turns on compressor still pretty hot, but hopefully all it takes is the ice on the tops boliviana. Go see here and turn the song.	65	75.389388	[side, start]	[compressor still pretty hot, pastors pretty hot]
16	videoplayback-Scene-008.mp3	I'll just verify that the cold side line get back to chili all the way and it is if it's way colder.	22	7.993469	[way, line, side]	[cold side line get back, way colder]
17	videoplayback-Scene-009.mp3	Play Cold already. I'll stay with it for about 5 minutes and make sure it stays nice and cold.	19	6.452245	[minute, play]	[play cold already, stays nice]
6	videoplayback-Scene-010.mp3	I was actually up here on the roof the other day and saw this unit and felt it and it was ice cold.	23	5.825306	[roof, unit]	[ice cold, unit]
1	videoplayback-Scene-011.mp3	So I knew today and it probably was my hard start kit on a capacitor. That was just having trouble getting the compressor to stay.	25	8.202449	[capacitor, start, compressor, hard]	[hard start kit, trouble getting]



Video Captions using BERT QnA model



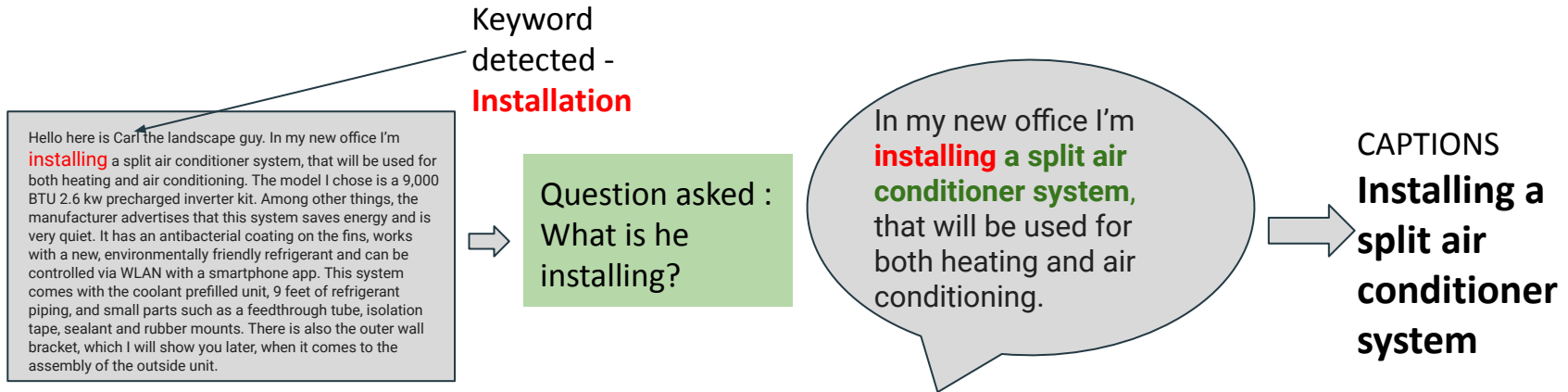
CAPTION detected - Installing split air conditioner system



CAPTION detected - Clean the barrel fan and plastic

Getting Captions from BERT QnA

1. First we decided some words like “Installation”, “Repair”, “Fault”, “service”, “cleaning”. (more words can be added)
2. Finding them in our transcripts and asking corresponding question from pretrained BERT model





Demo

Text Summarization (Extractive Summarization)

- Can be used as short description of complete video

"Today I have got an overheated compressor.Went ahead and pulled my disconnect.Discharged the cap.Got a dangling capacitor there got a video on how to secure that.Make that better.I got ice on the compressor to cool it down and my suspicion is that it is the hard start kit that has gone out on this.I can see it pretty much discolored.Already discharged my run cap but since I am here I am going to go ahead and replace the capacitor and the hard start kit all at the same time. Just loosen the strap up and I usually remove these just by slipping my screwdriver underneath the post.Slipping the lead off.I find the yellow one goes to one side and the blue and red on the other side for the capacitor for my particular units.Mostly just mimicking what is already there. The capacitor is pretty hot.OK.Out with the old one and in with the new one.Again this one has got blue and red on one side and yellow on the other side.There we go. Tighten our strap down.And want to find a good place to clip this on.That'll work there. Hard start kit. Good to go. Now we'll fire it up. See if it turns on. Compressor is still pretty hot but hopefully all it takes was the ice on the top to cool it down.We'll see here.Going to turn this on.Get it going here.Here's plugging in the disconnect back here. Aw yeah. Fired right up. Back in business. Cool things down again. Now I will just verify that the cold side line gets nice and chilly all the way. And it is it's way cold already. I'll stay with it for about five minutes. Make sure it stays nice and cold. I was actually up here on the roof the other day and saw this unit and felt it and it was ice cold. So I knew today that it probably was my hard start kit or the capacitor that was just having trouble getting the compressor to start. There's some other things that could be worked out here.This has a different type of wiring cover and those wire leads actually could be changed to an angled wire lead more like the red one so that the cover can be put back on.That's another story for another day.It is brutally hot today so just getting it going and keeping everything going good for now.And it's flashing nice and cold.So we're good here."

Today I have got an overheated compressor. So I knew today that it probably was my hard start kit or the capacitor that was just having trouble getting the compressor to start.

3 sentence summary of a big document

Extractive Summarization Algorithms

1. Pretrained BERT Encoders (BERT-SUM)

Summary of demo video 1

'Today I have got an overheated compressor. So I knew today that it probably was my hard start kit or the capacitor that was just having trouble getting the compressor to start.'

Summary of demo video 2

"Orange on arm, you're hard to clean technician to die. So you need to be able to push water all the way through that coil to clean it properly. It's not good just brushing it off with a brush because you're not cleaning the the coil all the way through and if you dyed it still means that We are getting drawer and all of those little fins is still going to fight its way through the day to get cold. Putting the gun into the drawing then I'm just giving it a real place to knock anything out of the drying."

2. Pysummarization library based sentence scoring

	summarize_result	scoring_data	scores
0	Orange on arm, you're hard to clean technician to die.\n	(0, 8.0)	8.000000
1	I'm going to walk you through our claim that we carried out in a resort on the Gulf Coast andThe plane will be carried out using younique hard to clean machine and out how to clean catchment bags and you can see the wrecking the catchment bag there as we speak.\n	(1, 29.46938775510204)	29.469388
2	It probably would have taken him up to an app to achieve the same result as we've just achieved there in 60 Seconds.\n	(5, 4.9)	4.900000
3	We've already put a cleaning agent through this coil and the what's coming out of that gun is pure water and a mixture as you can see.\n	(10, 11.130434782608695)	11.130435
4	So you need to be able to push water all the way through that coil to clean it properly.\n	(12, 4.764705882352941)	4.764706
5	And you can see it's coming back to almost new game.\n	(14, 7.0)	7.000000
6	Putting the gun into the drawing then I'm just giving it a real place to knock anything out of the drying.\n	(23, 4.083333333333333)	4.083333
7	And last thing we do is his you can dancing out as long as you can dancers reachable.\n	(34, 6.4)	6.400000
8	We clean it if it's on the ground likeThis you say that then it'll need cleaned.\n	(35, 5.818181818181818)	5.818182
9	If it's in the air up on the roof itself cleans.\n	(36, 4.166666666666667)	4.166667

Pipeline flow

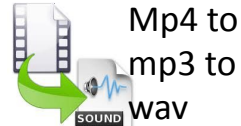


Remote support video

Using shot
detection results



Getting
multiple
videos



If duration of
video > 1 min



Preprocess
text data
and run
algorithms



Final
transcript



Use google text to speech API
by uploading audio files on
cloud storage else don't need
to upload

Time span detection using text

- LDA Topic modeling approach to cluster sentences

		sentence	topic
0	Today, I've got an overheated compressor went ahead and pulled my disconnect discharge the cap got a dangling to Pastor there got a video on how to secure that make that better. I got ice on the compressor to cool it down cleaning and my catfish in is that it's the hard start kit that the gun out on this I can see it very much discolored already discharged my run cap, but since I'm here, I'm g...		1
1	Louis. I find the yellow one goes to one side and a blue and red on the other side service Pastor my particular unit.		1
2	pastors pretty hot This one's got blue and red on one side and yellow on the other side. Exeter scrap down find a good place to flip this on. I work there. Hard start kit now fired up if it turns on compressor still pretty hot, but hopefully all it takes is the ice on the tops boliviana. Go see here and turn the song.		1
3	I'll just verify that the cold side line get back to chili all the way and it is if it's way colder.		0
4	Play Cold already. I'll stay with it for about 5 minutes and make sure it stays nice and cold.		0
5	I was actually up here on the roof the other day and saw this unit and felt it and it was ice cold.		0
6	So I knew today and it probably was my hard start kit on a capacitor. That was just having trouble getting the compressor to stay.		1
7	Start is some of the things that can be worked out here in this type of a different type of wiring cover. And those wire leads actually should be changed to angle choir. These were like V.		0
8	Correct way to cover can be put back on.		0
9	Another story for another day. It's really hot Today Show. Just kidding going keeping everything going good.		0
10	Man flashing lights and called your work at here.		1

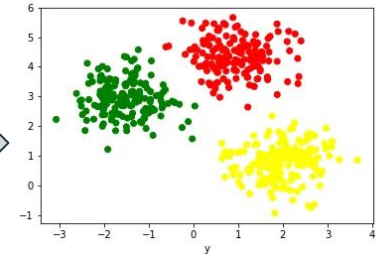
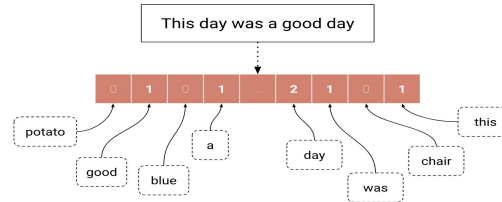
- Using pretrained BERT model to get sentence embeddings and clustering sentences using k-means clustering algorithm

Hello here is Carl the landscape guy. In my new office I'm installing a split air conditioner system, that will be used for both heating and air conditioning. The model I chose is a 9,000 BTU 2.6 kw precharged inverter kit. Among other things, the manufacturer advertises that this system saves energy and is very quiet. It has an antibacterial coating on the fins, works with a new, environmentally friendly refrigerant and can be controlled via WLAN with a smartphone app. This system comes with the coolant prefilled unit, 9 feet of refrigerant piping, and small parts such as a feedthrough tube, isolation tape, sealant and rubber mounts. There is also the outer wall bracket, which I will show you later, when it comes to the assembly of the outside unit. Then here we have the indoor unit, which is very light. It comes with a cable that will connect both units. It also includes the manual, the remote control and a wall holder for it. Both devices seemed to have been well-packed and arrived undamaged. This is the back of the wall mount. The indoor unit will go on this brick and concrete wall. I measure the distance between the holes of the wall bracket from the outer edge of the unit. Horizontally, the plate is slightly adjustable. A minimum distance of half a foot from the ceiling must be kept so that the air can flow properly. I draw the height of the upper holes with the help of a level.

Using
BERT

"Lion is the king of the jungle."
"The tiger hunts in this forest."
"Everybody loves New York."

Sentence embeddings



Sentence clustering

Different approaches implemented

- Sentence clustering
 - Using pretrained BERT model to get sentence embeddings and clustering sentences using k-means clustering algorithm
 - LDA Topic modeling approach to cluster sentences
- Classification of text into 2 - “Installing”, “repairing” and then adding these words with our tags
- Using POS tag analysis to get relevant words near the entity which could be added with entities in our tagging algorithm

Challenges

- Speech to text model sometimes is not able to recognize domain specific words like capacitor, condenser etc which are very important for our task.
- Working with big videos was very challenging. To get transcription of long videos we have to upload a .wav format file which occupies 3 times the memory of the original video file, so uploading it to google cloud takes a lot of time.
- We were not able to get a good video/text with very different tasks which could have helped us in sentence clustering task
- Getting useful timestamps was not easy using google text to speech
- Sequential clustering difficult as tasks are not very different
- Existing vocabulary is not very good

References

<https://medium.com/analytics-vidhya/topic-modelling-using-latent-dirichlet-allocation-in-scikit-learn-7daf770406c4>

https://github.com/HritikAttri/nlp/blob/master/latent_dirichlet_allocation.ipynb

<https://github.com/UKPLab/sentence-transformers> and its corresponding paper

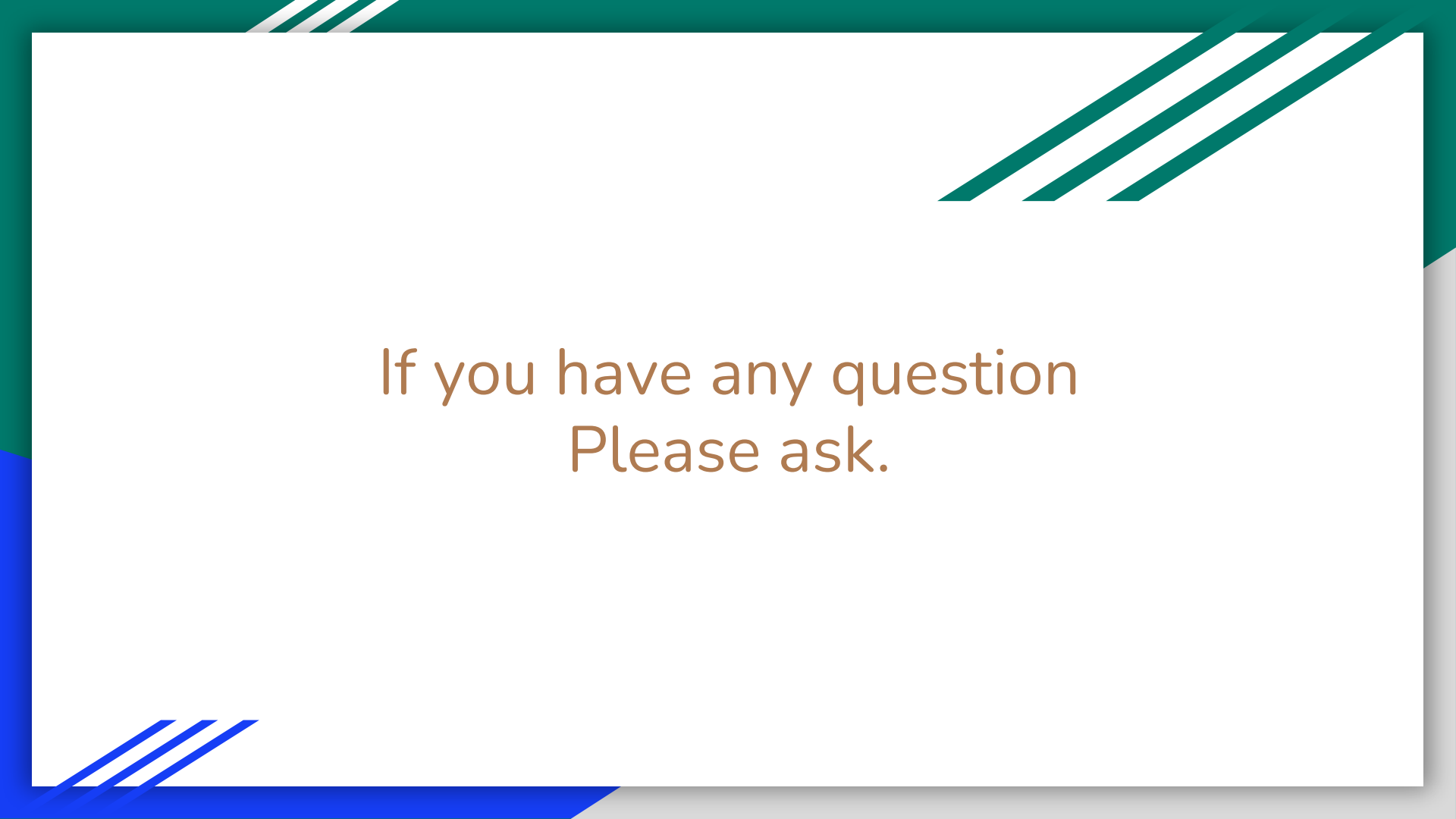
<https://github.com/nlpyang/PreSumm> and its corresponding paper

Internship Experience

- Great learning experience
- Learned and explored a lot in these 2 weeks
- Everyday discussions with mentor was very helping and motivating
- Due to short time I was not able to add many features to my algorithm



*THANK YOU DAIKIN FOR THIS ONLINE
INTERNSHIP*



If you have any question
Please ask.