Single Document Summarization Experiment - Short document

1 introduction

We compared short document summarization models fine-tuned on dataset(s) for text summarization task available on Hugging-Face for BART and PEGASUS both with maximum input length of 1024 words these models have different length of its generated summary length. We denoted each fine-tuned model with M_x. Automatic evaluations using ROUGE-1, ROUGE-2, ROUGE-3, ROUGE-L, CHRF-1, Meteor, and BertScore was carried out on each M_x generated summary with respect to the reference summary. And executed factual consistency check with the source document as evidence and the generated summary as claim.

The following are brief description of the fine-tuned models. The parameters of each fine-tuned model can be found in the dedicated github repository (Training-Parameters).

- M_1 - **BART large**: *facebook/BART-large-cnn*, BART large fine-tuned on *cnn* dataset. We use the PyTorch implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_2 - **BART large**: *sumedh/distilBART-cnn-12-6-amazonreviews*, distilled BART large (Bart large pretrained weight fine-tuned with cnn dataset for a 12 layer encoder and 6 layer decoder model) fine-tuned on *amazonreviews* dataset. We use the PyTorch implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_3 - **BART large**: *facebook/BART-large-xsum*, BART large fine-tuned on *xsum* dataset. We use the TensorFlow implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_4 - **PEGASUS large**: *google/PEGASUS-large-cnn_dailymail*, PEGASUS large fine-tuned on *cnn_dailymail* dataset. We use the PyTorch implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_5 - **PEGASUS large**: *google/PEGASUS-large-xsum*, PEGASUS large fine-tuned on *xsum* dataset. We use the PyTorch implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_6 - **PEGASUS large**: *google/PEGASUS-large*, PEGASUS large fine-tuned on *xsum, cnn_dailymail, newsroom, multi_news, gigaword, wikihow, reddit_tifu, big_patent, arxiv, pubmed, aeslc* datasets. We use the PyTorch implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_7 - **PEGASUS large**: *google/PEGASUS-large*, PEGASUS large fine-tuned on *xsum, cnn_dailymail, newsroom, multi_news, gigaword, wikihow, reddit_tifu, big_patent, arxiv, pubmed, aeslc* datasets. We use the TensorFlow implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_8 - **PEGASUS large**: *google/PEGASUS-large-xsum*, PEGASUS large fine-tuned on xsum dataset. We use the TensorFlow implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

- M_9 **- BART large**: $datien228/distilBART\text{-}cnn\text{-}12\text{-}6\text{-}ftn\text{-}multi\_news$;
  sshleifer/distilbart-cnn-12-6 (Bart large pretrained weight fine-tuned with cnn dataset for a 12 layer encoder and 6 layer decoder model) fine-tuned on the English portion of multi-news dataset. We use the PyTorch implementation of Hugging-Face Transformers library for Conditional Generation to run the document samples on this model.

1.1   Short document summarization results

Table 1 report the evaluation of
Example-short-document 1 on ROUGE-1, ROUGE-2, ROUGE-3, ROUGE-L, CHRF-1, Meteor, BertScore metrics, and Factual consistency ('Y'). In bold is the top 2 score for each metric.

- M_6 and M_7, though they are the same model (same datasets, parameters and hyper-parameters), show the possible difference between the implementation in PyTorch and TensorFlow of the Hugging-Face Transformers library.

- M_7, highlights the well know problem of n-gram repeat.

- M_4, highlight the sentence-level separator ($< n >$) in the generated summary, as such recalls the need for a more refined generated summary or the use of post-processing methods.

- M_2, out performance other model on ROUGE-2, ROUGE-3, and
  ROUGE-L and BertScore in Example-short-document 1.

- M_9, showed very interesting score on ROUGE-1, CHRF, and Meteor; producing much more detail summary compared to M_2, showing thus, the benefits obtained from distillation and the use of dataset like multi-news which contains documents that cut across various domain.

- All fine-tuned model M_x generated summaries that are factual consistent with the source document.

2   Sampled document

Example-short-document 1 Given the following source document and reference from the CNN dataset:

- **Source Document -**
  "a us citizen has been killed in a mortar attack in yemen after he traveled to the country in an attempt to extricate his pregnant wife and daughter from the civil war there and fly them to california, family say. jamal al-labani was an oakland gas station owner, his cousin mohammed alazzani told kpix-tv. according to alazzani, al-labani was in yemen visiting his pregnant wife and the couple's two-and-a-half-year-old daughter. alazzani told kpix al-labani was trying to get his family out of the war-torn middle eastern nation and take them to oakland - but he couldn't because the us has withdrawn its diplomatic staff and the country has shut down most airports. rebels from the houthi islamist group have been battling to take aden, a last foothold of fighters loyal to saudi-backed president abd-rabbu mansour hadi. they have advanced to the city center despite 11 days of air strikes by a saudi-led coalition of mainly gulf air forces. scroll down for video. family: jamal al-labani was in yemen visiting his pregnant wife and the couple's 2 1/2-year-old daughter.
  attack: jamal al-labani's family has said he was struck by mortar
  shrapne after leaving a mosque tuesday and soon died. sunni muslim saudi arabia launched the air strikes. on march 26 in an attempt to turn back the iran-allied shi'ite houthis, who already control yemen's capital sanaa, an restore some of hadi's crumbling authority. the air and sea campaign has targeted houthi convoys, missiles and weapons stores and cut off any possible outside reinforcements - although the houthis deny saudi accusations that they are armed by tehran.
  career: al-labani reportedly wished to take his family to oakland,

though there was no way to do so given what has been happening in yemen. the fighting has failed so far ... ...”

- **Reference** -
"jamal al-labani was a oakland, california, gas station owner, as well as a husband and a father-of-three. al-labani traveled to yemen in an attempt to extricate his pregnant wife and daughter from the civil war there and fly them to california. he was unable to because the us withdrew its diplomatic staff in february. yemen also recently shut down most of its airports. al-labani was struck by mortar shrapnel after leaving a mosque tuesday in aden and soon died. al-labani's cousin has said houthi forces launched the mortar shelling"

- **Generated summary**: The generated summary for each pre-trained model:
M_1 - jamal al-labani was an oakland gas station owner, his cousin mohammed alazzani told kpix-tv. He was in yemen visiting his pregnant wife and the couple's two-and-a-half-year-old daughter. He reportedly wished to take his family to oakland, though there was no way to do so given what has been happening in the country.

M_2 - a us citizen has been killed in a mortar attack in yemen after he traveled to the country in an attempt to extricate his pregnant wife and daughter from the civil war there and fly them to california, family say. jamal al-labani was an oakland gas station owner.

M_3 - A US citizen has been killed while trying to get his family out of war-torn yemen and take them to oakland.

M_4 - jamal al-labani was in yemen visiting his pregnant wife and the couple's two-and-a-half-year-old daughter.$< n >$Al-labani reportedly wished to take his family to oakland, though there was no way to do so given what has been happening in yemen.

M_5 - jamal al-labani was in yemen visiting his pregnant wife and his two-and-a-half-year-old daughter.

M_6 - alazzani told kpix al-labani was trying to get his family out of the war-torn middle eastern nation and take them to oakland - but he couldn't because the us has withdrawn its diplomatic staff and the country has shut down most airports. family: jamal al-labani was in yemen visiting his pregnant wife and the couple's 2 1/2-year-old daughter.

M_7 - a us citizen has been killed in a mortar attack in yemen after he traveled to the country in an attempt to extricate his pregnant wife and daughter from the civil war there and fly them to california, say family say jamal al-labani was an oakland gas station owner, his cousin mohammed al-rabazzani told al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old daughter al-labani was in town visiting his wife and two-year-old.

M_8 - A pregnant woman and her family have been killed in air strikes on a mosque in eastern Yemen, according to a family member.

M_9 - A US citizen has been killed in a mortar attack in yemen after he traveled to the country in an attempt to extricate his pregnant wife and daughter from the civil

war there and fly them to california, family say. jamal al-labani was an oakland gas station owner, his cousin mohammed alazzani told kpix-tv. According to alazzano, al-Labani was in y Yemen visiting his pregnant Wife and the couple's 2-and-a-half-year-old daughter, and was trying to get his family out of the war-torn country.

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGE-L	CHRF-1	Meteor	BertScore	FactCheck
M_1	0.3974	0.1299	0.0658	0.2564	0.3333	0.235	0.8695	1.0
M_2	**0.5655**	**0.3497**	**0.2979**	**0.3724**	**0.4749**	**0.344**	**0.9026**	1.0
M_3	0.2034	0.0172	0.0	0.1186	0.1257	0.0712	0.8635	1.0
M_4	0.3636	0.1135	0.0576	0.2238	0.2922	0.1684	0.8762	1.0
M_5	0.2261	0.1239	0.0721	0.1913	0.1852	0.0759	0.8647	1.0
M_6	0.4596	0.1887	0.1019	0.3354	0.4083	0.2839	0.8764	1.0
M_7	0.3537	0.1986	0.1517	0.2245	0.346	0.3171	0.8457	1.0
M_8	0.1681	0.0171	0.0	0.1176	0.1402	0.071	0.8418	1.0
M_9	**0.5714**	**0.2995**	**0.2378**	**0.3492**	**0.4855**	**0.3907**	**0.8849**	1.0

Table 1: Evaluation of Example-short-document 1.

Example-short-document 2: Given the following source document and reference from the PubMed dataset, Table 2 show result of Evaluation of Example-short-document 2. In bold is the top 2 score for each metric, and the minimum factual consistent fine-tuned model:

- **Source Document** -
  "stainless steel alloys have remained the material of choice despite the emergence of the more recent titanium , composite and polycarbonate orthodontic brackets. stainless steel alloy contains 8%-12% nickel, 17%-22% chromium and other elements such as copper, iron molybdenum, manganese, silicon and sulfur[3 - 5] in the oral environment, orthodontic brackets are subjected to mechanical and chemical damaging which results in susceptibility to corrosion. corrosion leads to loss of substance from the material, change in its structural characteristics, or loss of structural integrity. due to the electrolytic capabilities of saliva various types of brackets are commercially available and each demonstrates a unique pattern of corrosion. in soldered brackets, this corrosion is due to the presence of dissimilar metals (i.e. the silver solder and the stainless steel), a phenomenon termed galvanic corrosion. metal injection molding (mim) brackets are manufactured as a single unit and therefore do not demonstrate galvanic corrosion. corrosion can have detrimental effects on the surface of stainless steel brackets due to the continuous loss of metal ions. corrosion can increase the surface roughness of the bracket which leads to elevated friction forces between the bracket and the archwire . this increase in friction results in unfavorable distribution of forces and reduces the effectiveness of archwire guided orthodontic tooth movement.[7 - 8] moreover, by mean of increased stress, the friction would further accelerate the corrosion process. the release of metal ions following the corrosion of brackets has concerned clinicians and has instigated research in this field. among these metal ions, furthermo2re, direct and prolonged contact of orthodontic "appliances and the resulting corrosion products have been shown to cause local pain and ... ..."

- **Reference** -
  "statement of the problem : stainless steel brackets release metallic ions following the process of corrosion in the oral environment. these released ions have potential adverse effects on health, friction between wire and bracket, staining, strength of brackets. choosing a bracket with favorable corrosive properties; therefore, should be a goal of every practitioner. purpose : the goal of this study is to compare the amount of corrosion among five different brands of brackets using inductively coupled plasma (icp) mass spectrometry . materials and method : five different brands of brackets (dentaurum, 3 m, ortho organizer, cobas and o.r.g) were chosen and ten brackets were selected from each brand . a piece of stainless steel wire was ligated to each bracket. the bracket -

archwire complex was then immersed in artificial saliva . subsequently, the samples were analyzed using an icp device and the levels of iron, chromium, nickel, and manganese ions were measured. results : the findings of this study demonstrated that iron was released the most from the tested brackets, followed by nickel. we also found that the cobas bracket had the most ion release among the tested brackets (p ¡ 0.05)"

- **Generated summary**: The generated summary for each pretrained model:

  M_1 - stainless steel alloys have remained the material of choice despite the emergence of the more recent titanium , composite and polycarbonate orthodontic brackets. corrosion can have detrimental effects on the surface of stainless steel brackets due to the continuous loss of metal ions. direct and prolonged contact of orthodontic appliances and the resulting corrosion products have been shown to cause local pain and ... ...

  M_2 - stainless steel alloys have remained the material of choice despite the emergence of the more recent titanium, composite and polycarbonate orthodontic brackets . corrosion can have detrimental effects on the surface of stainless steel brackets due to the continuous loss of metal ions ...

  M_3 -Stainless steel has been the most commonly used material for orthodontic brackets for more than 50 years.

  M_4 - corrosion can increase the surface roughness of the bracket which leads to elevated friction forces between the bracket and the archwire .$< n >$The release of metal ions following the corrosion of brackets has concerned clinicians and has instigated research in this field .

  M_5 - stainless steel brackets are the most common material used in the manufacture of orthodontic appliances.

  M_6 - corrosion can have detrimental effects on the surface of stainless steel brackets due to the continuous loss of metal ions. this increase in friction results in unfavorable distribution of forces and reduces the effectiveness of archwire guided orthodontic tooth movement.[7 - 8] moreover, by means of increased stress, the friction would further accelerate the corrosion process.

  M_7 - corrosion can have effects on the surface of stainless steel brackets due to the continuous loss of metal ions.

  M_8 - corrosion of stainless steel orthodontic brackets.

  M_9 - a new study suggests that orthodontic brackets are more susceptible to the corrosion process of metal ions that can lead to the loss of substance from the material, change in its structural characteristics, or loss of structural integrity, the New York Times reports. The study, published in the journal Proceedings of the Journal of the American Journal of Medicine, found that the metal ions in the brackets can be released by the presence of dissimilar metals (i.e. the silver solder and the stainless steel) in soldered brackets, a phenomenon known as galvanic corrosion, which can be seen as a phenomenon called " galvanic

Example-short-document 3: Given the following source document and reference from the arXiv dataset, Table 3 show result of Evaluation of Example-short-document 3. In bold is the top 2 score for each metric:

- **Source Document** -
  "deep neural networks (dnns) have been receiving ubiquitous success in wide applica-

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGEL	CHRF1	Meteor	BertScore	FactCheck
M_1	**0.257**	**0.0648**	0.0163	0.1446	**0.2644**	**0.1151**	0.8195	1.0
M_2	0.2096	0.0617	0.0178	0.1397	0.2124	0.0847	0.8185	1.0
M_3	0.0686	0.0198	0.0	0.0588	0.0847	0.0295	0.809	1.0
M_4	0.2271	0.0617	**0.0178**	0.1397	0.2059	0.0722	**0.8299**	1.0
M_5	0.099	0.04	0.0101	0.0792	0.0971	0.0431	0.8108	1.0
M_6	0.2469	0.0415	0.0167	**0.1481**	0.2489	0.1028	0.8217	**0.85**
M_7	0.1359	0.049	**0.0198**	0.1165	0.1047	0.051	**0.833**	1.0
M_8	0.0518	0.0209	0.0106	0.0518	0.0601	0.0217	0.8154	1.0
M_9	**0.3379**	**0.0694**	0.007	**0.1793**	**0.3118**	**0.1681**	0.8144	1.0

Table 2: Evaluation of Example-short-document 2.

tion, ranging from computer vision xcite, to speech recognition xcite, natural language processing xcite, and domain adaptation xcite. as the sizes of data mount up, people usually have to increase the number of parameters in dnns so as to absorb the vast volume of supervision. high performance computing techniques are investigated to speed up dnn training, concerning optimization algorithms, parallel synchronisations on clusters w/o gpus, and stochastic binarization / ternarization , etc xcite. on the other hand the memory and energy consumption is usually, if not always, constrained in industrial applications xcite. for instance, for commercial search engines (e.g., google and baidu) and recommendation systems (e.g., netflix and youtube), the ratio between the increased model size and the improved performance should be considered given limited online resources. compressing the model size becomes more important for applications on mobile and embedded devices xcite. having dnns running on mobile apps owns many great features such as better privacy, less network bandwidth and real time processing. however, the energy consumption of battery-constrained mobile devices is usually dominated by memory access, which would be greatly saved if a dnn model can fit in on-chip storage rather than dram storage (c.f. xcite for details). a recent trend of studies are thus motivated to focus on compressing the size of dnns while mostly keeping their predictive performance xcite. with different intuitions, there are mainly two types of dnn compression methods, which could be used in conjunction for better parameter savings. the ... ..."

- **Reference** -
  "as the complexity of deep neural networks (dnns) trend to grow to absorb the increasing sizes of data, memory and energy consumption has been receiving more and more attentions for industrial applications, especially on mobile devices. this paper presents a novel structure based on functional hashing to compress dnns, namely funhashnn. for each entry in a deep net, funhashnn uses multiple low-cost hash functions to fetch values in the compression space, and then employs a small reconstruction network to recover that entry. the reconstruction network is plugged into the whole network and trained jointly. funhashnn includes the recently proposed hashednets xcite as a degenerated case, and benefits from larger value capacity and less reconstruction loss. we further discuss extensions with dual space hashing and multi-hops. on several benchmark datasets, funhashnn demonstrates high compression ratios with little loss on prediction accuracy."

- **Generated summary**: The generated summary for each pretrained model:

  M_1 - deep neural networks (dnns) have been receiving ubiquitous success in wide applications. The ratio between the increased model size and the improved performance should be considered given limited online resources. There are mainly two types of dnn compression methods, which could be used in conjunction for better parameter savings.

  M_2 - deep neural networks (dnns) have been receiving ubiquitous success in wide applications, ranging from computer vision xcite, natural language processing xcites, and domain adaptation xciting. on the other hand the memory and energy consumption is

usually, if not always

M_3 - In our series of articles, we look at ways to improve the performance of deep neural networks (dnns).

M_4 - Deep neural networks (dnns) have been receiving ubiquitous success in wide applications .$< n >$People usually have to increase the number of parameters in dnns so as to absorb the vast volume of supervision .$< n >$High computing techniques are investigated to speed up dnn training .

M_5 - In this paper we focus on improving the performance of deep networks by compressing their model size.

M_6 - compressing the model size becomes more important for applications on mobile and embedded devices xcite. however, the energy consumption of battery-constrained mobile devices is usually dominated by memory access, which would be greatly saved if a dnn model can fit in on - chip storage rather than dram storage (c.f.

M_7 - netflix deep neural networks (dnns) have been receiving ubiquitous success in wide applications, ranging from computer vision to speech recognition xcite, so predictive xcite, natural language processing xcite, and domaincite xcite.

M_8 - This paper presents the results of a study on the use of compression techniques to improve the performance of computer vision systems.

M_9 - as the sizes of data mount up, people usually have to increase the number of parameters in deep neural networks so as to absorb the vast volume of supervision. High performance computing techniques are being investigated to speed up dnn training, concerning optimization algorithms, parallel synchronisations on clusters w / o gpus, and stochastic binarization / ternarization, etc. on the other hand the memory and energy consumption is usually, if not always, constrained in industrial applications, such as search engines and recommendation systems. "The ratio between the increased model size and the improved performance should be considered given limited online resources,

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGE-L	CHRF-1	Meteor	BertScore	FactCheck
M_1	0.2199	0.0529	0.0214	0.1257	**0.2562**	0.1275	**0.8449**	1.0
M_2	0.2099	**0.0782**	**0.0452**	0.1215	0.2372	0.122	0.8242	1.0
M_3	0.125	0.0506	0.0385	0.075	0.0946	0.0656	0.8429	1.0
M_4	**0.2366**	0.0652	0.033	**0.1398**	0.2151	**0.1392**	0.842	1.0
M_5	0.1384	0.0255	0.0	0.0755	0.0982	0.0506	**0.844**	1.0
M_6	0.2176	0.0314	0.0	0.1244	0.2382	0.1156	0.8221	1.0
M_7	0.1503	0.0468	0.0237	0.1156	0.1954	0.0973	0.8236	1.0
M_8	0.1585	0.0247	0.0125	0.1098	0.1172	0.0656	0.840	1.0
M_9	**0.3154**	**0.1004**	**0.0422**	**0.1743**	**0.364**	**0.1914**	0.8144	1.0

Table 3: Evaluation of Example-short-document 3.

Example-short-document 4: Given the following source document and reference from the WikiHow dataset, Table 4 show result of
Evaluation of Example-short-document 4. In bold is the top 2 score for each metric:

- **Source Document** -
  To do this they should offer a variety of ways to collect customer card details and process payments. These are often defined by your own technical expertise. It could

mean providing a simple means of redirecting customers from your site to their hosted payment pages. Or maybe you require a way for you to authorise payments remotely. Whatever your requirement, a dedicated PSP should have the solutions to meet it. One size does not fit all, so dont let anyone persuade you otherwise.;, A fixed monthly fee starts at around 10, but there are some cheaper options available, starting as low as 0.05 per transaction. As a rule of thumb, the higher your transaction volume, the lower the unit cost. And remember to compare like with like. Ask if its a complete solution with inclusive fees or whether youll be paying the bank separately on top of that. Will the PSP with those oh-so-attractive prices charge huge set-up fees for enabling services such as deferred payments, a virtual terminal, or subscriptions that come as standard with other PSPs?. Look beyond the headline figures and consider the overall long-term operational cost of partnering with each PSP. For example, does the PSP have limited support for fraud management? The cost of flimsy security could do much more damage to your bottom line than any fractional differences in rates. As an online merchant you need to make sure you can also manage them as efficiently as possible. Which is why an effective PSP should provide you with the right reporting and administration tools to manage your merchant services... Will you have access to real-time transaction statements? Can you export valuable customer data? Is the reporting sophisticated enough to allow you to answer questions that can better target future sales. For ... ...

- **Reference** -
  Enquire about their technical solutions Technically your PSP must be capable of supporting all of your plans. Look for genuinely competitive rates Costs (set-up fees and cost per transaction) can vary greatly between competing PSPs, so you need to shop around for the best rates. Establish if there are any upfront costs The real costs associated with accepting online card payments do not start and end at the rate quote. Manage reporting and administration facilities Accepting online payments is only one part of the e-commerce equation. Enquire about their technical support A service is not a service unless its fully backed up. Find out if you would be protected against fraud When accepting card payments online, fraud is potentially the biggest threat to your profits. Make sure you can trust their services Online, the difference between a prospect and a customer is trust. Look out for a full service history Okay, its not a car, but the principle is the same.

- **Generated summary**: The generated summary for each pretrained model:

  M_1 - One size does not fit all, so dont let anyone persuade you otherwise.;, A fixed monthly fee starts at around 10, but there are some cheaper options available. The higher your transaction volume, the lower the unit cost. Ask if its a complete solution with inclusive fees or whether youll be paying the bank separately on top of that.

  M_2 - Like Like Like With Like Like Like I Used To Be Used To Use It. Don't waste your time and money. You'll be happy with the results of the results. And remember to compare like With Like. With like. It's a complete solution with inclusive fees

  M_3 - As an online merchant you need to be able to manage your business effectively.

  M_4 - One size does not fit all, so dont let anyone persuade you otherwise $.< n >$A fixed monthly fee starts at around 10, but there are some cheaper options available, starting as low as 0.05 per transaction $.< n >$Look beyond the headline figures and consider the overall long-term operational cost of partnering with each PSP .

  M_5 - A payment processing service provider (PSP) should be able to help you grow your online business.

M_6 - Will the PSP with those oh-so-attractive prices charge huge set-up fees for enabling services such as deferred payments, a virtual terminal, or subscriptions that come as standard with other PSPs?. Which is why an effective PSP should provide you with the right reporting and administration tools to manage your merchant services...

M_7 - Which is why an effective PSP should provide you with the right reporting and administration tools to manage your merchant services... Will you have access to real-time transaction statements?

M_8 - Merchant services providers (PSPs) aim to make it easier for you to accept payments online.

M_9 - If you're an online merchant, you need to make sure you can also manage your merchant services as efficiently as possible. A fixed monthly fee starts at around 10, but there are some cheaper options available, starting as low as 0.05 per transaction. As a rule of thumb, the higher your transaction volume, the lower the unit cost. Ask if its a complete solution with inclusive fees or whether you'll be paying the bank separately on top of that. Will the PSP with those oh-so-attractive prices charge huge set-up fees for enabling services such as deferred payments, a virtual terminal, or subscriptions that

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGE-L	CHRF-1	Meteor	BertScore	FactCheck
M_1	**0.2432**	0.0091	0.0	0.1171	0.2155	**0.1269**	0.8351	1.0
M_2	0.1415	0.0095	0.0	0.0943	0.1168	0.0851	0.8104	1.0
M_3	0.0904	0.0229	0.0116	0.0678	0.0703	0.0397	**0.8463**	1.0
M_4	0.21	0.0184	0.0	0.0913	0.209	0.1203	0.8274	1.0
M_5	0.1006	0.0	0.0	0.067	0.0821	0.0374	0.8389	1.0
M_6	0.2028	**0.0372**	**0.0188**	**0.129**	**0.2335**	0.0911	0.8416	1.0
M_7	0.1658	0.0209	0.0106	0.1036	0.1737	0.0495	**0.8425**	1.0
M_8	0.1124	0.0114	0.0	0.0787	0.0848	0.0437	0.8352	1.0
M_9	**0.3456**	**0.0741**	**0.0299**	**0.125**	**0.3266**	**0.2123**	0.8421	1.0

Table 4:   Evaluation of Example-short-document 4.

Example-short-document 5: Given the following source document and reference from the Multi-News dataset, Table 5 show result of Evaluation of Example-short-document 5. In bold is the top 2 score for each metric, and the minimum factual consistent fine-tuned model:

- **Source Document** -
  Size really does seem to matter when it comes to cancer risk. Being tall undoubtedly has its benefits. You can see in a crowd and grab objects off high shelves. But with the good comes the bad. The taller you are, the higher your odds of developing cancer, and a new paper has added weight to this. key points Key points: Taller people have more cells in their body, as well as higher levels of a protein that encourages cells to divide and grow For every 10cm over the average height, a person's risk for cancer increases 10 per cent New analysis of data from big cancer studies supports this, and also finds a few specific cancers to be more or less strongly correlated with height Leonard Nunney, an evolutionary biologist at the University of California, Riverside, looked at massive cancer databases to find out how the number of cells in a person's body, using height as a proxy, might affect their risk of developing cancer. Reporting in the Proceedings of the Royal Society B, he found being taller and having more cells did mean more cancer overall: For every 10 centimetres over the average height, the risk of developing any cancer increased by around 10 per cent. This fits with previous studies. "If you were comparing a 5-foot guy to a basketball player who's over 7 feet tall, then that basketball player has around twice the risk of cancer across the board," Professor Nunney said. He also found that taller people were at much higher risk of melanoma, and women specifically had greater odds of developing thyroid cancer. But it doesn't mean tall

people should panic. "Now, you can't do anything about your height, but what you can do is tell extremely tall individuals that they should be aware ... ...

- **Reference** -
A new study on cancer won't make for pleasant reading for tall people. Consider this quote from lead researcher Leonard Nunney of the University of California Riverside: "If you were comparing a 5-foot guy to a basketball player who's over 7 feet tall, then that basketball player has around twice the risk of cancer across the board," he tells Australia's ABC. Yes, Nunney's study in the Proceedings of the Royal Society B suggests that taller people are at greater risk for cancer. The surprisingly simple reason? They have more cells, and thus more things go can wrong in those cells, explains the Guardian. Specifically, the study found that cancer risk rises by 10% for every 4 inches people are above average height5 feet 4 for women and 5 feet 9 for men, reports CNN. The findings held true for 18 of 23 cancers studied. "Now, you can't do anything about your height, but what you can do is tell extremely tall individuals that they should be aware of this, and if they have any concerns, to get checked," says Nunney. Cancers of the colon and kidney were among those with the strongest correlation to height. A researcher not involved with the study says it backs up previously seen links between height and cancer

- **Generated summary**: The generated summary for each pretrained model:

M_1 - Taller people have more cells in their body, as well as higher levels of a protein that encourages cells to divide and grow. For every 10cm over the average height, a person's risk for cancer increases 10 per cent. Tall people were at much higher risk of melanoma, and women specifically had greater odds of developing thyroid cancer.

M_2 - Towery people have more cells in their body, as well as higher levels of a protein that encourages cells to divide and grow For every 10cm over the average height, a person's risk for cancer increases 10 per cent New analysis of big cancer studies supports this

M_3 - Taller people have more cells in their body, as well as higher levels of a protein that encourages cells to divide and grow.

M_4 - For every 10cm over the average height, a person's risk for cancer increases 10 per cent . $< n >$ Taller people were at much higher risk of melanoma, and women specifically had greater odds of developing thyroid cancer .

M_5 - How tall are you?

M_6 - key points Key points: Taller people have more cells in their body, as well as higher levels of a protein that encourages cells to divide and grow For every 10cm over the average height, a person's risk for cancer increases 10 per cent New analysis of data from big cancer studies supports this, and also finds a few specific cancers to be more or less strongly correlated with height Leonard Nunney, an evolutionary biologist at the University of California, Riverside, looked at massive cancer databases to find out how the number of cells in a person's body, using height as a proxy, might affect their risk of developing cancer. Reporting in the Proceedings of the Royal Society B, he found being taller and having more cells did mean more cancer overall: For every 10 centimetres over the average height, the risk of developing any cancer increased by around 10 per cent.

M_7 - The Professor, you are taller higher your odds of developing cancer, and a new paper has added weight to this points. For every 10 centimetres over the average, a person's risk for cancer increases 10 per cent.

M_8 - How tall are you?

M_9 - If you're a 5-foot guy to a basketball player who's over 7 feet tall, then that basketball player has around twice the risk of cancer across the board, says an evolutionary biologist at the University of California, Riverside. He also found that taller people were at much higher risk of melanoma, and women specifically had greater odds of developing thyroid cancer. "Now, you can't do anything about your height, but what you can do is tell extremely tall individuals that they should be aware," he says. But it doesn't mean tall people should panic.

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGE-L	CHRF-1	Meteor	BertScore	FactCheck
M_1	0.259	0.0652	0.0146	0.1223	0.2248	0.11	**0.8574**	0.95
M_2	0.2097	0.0528	0.0152	0.1124	0.1767	0.0761	0.8448	0.95
M_3	0.0992	0.025	0.0084	0.0826	0.0911	0.0374	0.829	1.0
M_4	0.1875	0.0472	0.0079	0.1094	0.1646	0.0676	0.85	0.95
M_5	0.0269	0.0	0.0	0.0269	0.0095	0.0089	0.8047	0.95
M_6	**0.4409**	**0.1243**	**0.0652**	**0.2043**	**0.4022**	**0.231**	0.8561	1.0
M_7	0.1868	0.0314	0.0079	0.0856	0.1363	0.0697	0.845	1.0
M_8	0.0269	0.0	0.0	0.0269	0.0095	0.0089	0.8047	0.95
M_9	**0.5031**	**0.3734**	**0.3312**	**0.4214**	**0.4601**	**0.3116**	**0.8929**	**0.80**

Table 5: Evaluation of Example-short-document 5.

Example-short-document 6: Given the following source document and reference from the Big-Patent dataset, Table 6 show result of Evaluation of Example-short-document 6. In bold is the top 2 score for each metric:

- **Source Document** -
  the automated edge finishing apparatus and method of the present invention comprises hardware components and associated software, providing the ability to learn a trajectory of a workpiece by &#34 ; guarded moves,&#34 ; machining the workpiece by moving the workpiece along the trajectory and controlling the trajectory in real time. Similar workpieces can be machined from the learned trajectory without expensive fixtures by the sensors and software locating the tool and adjusting the trajectory . the invention is useful for performing edge finishing on intricately designed workpieces or workpieces with close edge finishing tolerances . the configuration of the preferred system is shown in fig1 and 2. the preferred invention comprises an xy table 10, a force sensor 12, cutting tool 14, xy table position control hardware 32, and a control system as shown in fig2. the preferred xy table 10 comprises a daedal series 200000 , or the like, powered by tlm120 linear motors from trilogy systems corporation, or the like. the linear actuators comprise three-phase brushless linear motors, with a stationary magnet track and a moving coil assembly. the linear motors are driven by dc amplifiers, such as pwm amplifiers. both table axes are equipped with incremental encoders with a resolution of 12, 700 counts/inch. the innermost level of table control is position control, by a controller 32 such as a dmc-520 motion controller from galil motion control, as shown in fig2 . this board controls position of both table axes using proportional plus derivative (pd) control action. the resulting position-controlled table is the starting point for the force control system discussed below . a ... ...

- **Reference** -
  the disclosure is directed to an apparatus and method for automated edge finishing using hybrid position / force control of an xy table. the disclosure is particularly directed to learning the trajectory of the edge of a workpiece by &#34 ; guarded moves &#34 ;. machining is done by controllably moving the xy table, with the workpiece mounted thereon, along the learned trajectory with feedback from a force sensor . other Similar workpieces can be mounted , without a fixture on the xy table, located and the learned trajectory adjusted

- **Generated summary**: The generated summary for each pretrained model:

M_1 - The invention is useful for performing edge finishing on intricately designed workpieces or workpieces with close edge finishing tolerances. The preferred invention comprises an xy table 10, a force sensor 12, cutting tool 14, position control hardware 32 and a control system as shown in fig2. Both table axes are equipped with incremental encoders with a resolution of 12, 700 counts / inch.

M_2 - the preferred xy table 10 comprises a daedal series 200000 , or the like, powered by tlm120 linear motors from trilogy systems corporation, or the ... the like. the invention is useful for performing edge finishing on intricately designed workpieces or workpieces ...

M_3 - The invention of an automated edge finishing apparatus and method is described below.

M_4 - An automated edge finishing apparatus and method of the present invention comprises hardware components and associated software $.< n >$The preferred invention comprises an xilal table , a force control sensor and a control board .

M_5 - The present invention relates to an automated edge control system and more particularly to an automated edge control system and more particularly to an automated edge control system and more particularly to an automated edge control system and more particularly to an automated edge control system and more particularly to an automated edge control system and more particularly to an automated edge

M_6 - the preferred invention comprises an xy table 10, a force sensor 12, cutting tool 14, xy table position control hardware 32, and a control system as shown in fig2. the innermost level of table control is position control, by a controller 32 such as a dmc - 520 motion controller from galil motion control, as shown in fig2.

M_7 - fig of the preferred system is a preferred configuration of the table hardware, and a preferred system as shown in fig2 0000 xy 10, a daedal series encoder, or the like , linear motors from linear systems, or like. this board controls position of both axes using the proportional axes plus (derivative pd) linear control , and the resulting position table is the starting point for the linear motion control system discussed below. the table resulting-controlled table is the starting point for the linear motion control system discussed below. this board controls position of both axes using the proportional axes plus (derivative pd) linear control, and the resulting position table is the starting point for the linear motion control system discussed below. this board controls position of both axes using the proportional axes plus (derivative pd) linear control, and the resulting position table is the starting point for the linear motion control system discussed below. this board controls position of both axes using the proportional axes plus (derivative pd) linear control, and the resulting position table is the starting point for the linear motion control system discussed below.

M_8 - The present invention relates to a finishing tool and more particularly to a finishing edge control system.

M_9 - a new system that can be used to cut a workpiece by moving the workpiece along a trajectory by guarded moves, and then machining the work piece by moving it along the trajectory and controlling the trajectory in real time, the New York Times reports. "The invention is useful for performing edge finishing on intricately designed workpieces or work pieces or workpieces with close edge finishing tolerances," the company says in a press release. "It's useful to perform edge finishing in the future, and it can be

machined from the learned trajectory without expensive fixtures by the sensors and software locating the tool and adjusting the

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGE-L	CHRF-1	Meteor	BertScore	FactCheck
M_1	**0.3673**	0.069	0.028	0.1905	**0.3199**	**0.2025**	0.832	1.0
M_2	0.288	0.0325	0.0	0.144	0.2473	0.1381	0.8151	1.0
M_3	0.2041	0.1042	**0.0426**	0.1224	0.1785	0.0608	0.8554	1.0
M_4	0.322	**0.1207**	**0.0351**	**0.2034**	0.283	0.1479	0.8376	1.0
M_5	0.1769	0.0276	0.0	0.1769	0.2505	0.0828	0.8017	1.0
M_6	0.2958	0.0714	0.029	0.1549	0.2541	0.1667	0.8283	1.0
M_7	0.2206	0.0148	0.0	0.1471	0.2009	0.1951	0.794	1.0
M_8	0.1961	0.0	0.0	0.1373	0.161	0.0605	**0.8385**	1.0
M_9	**0.4896**	**0.1158**	0.0213	**0.2396**	**0.4357**	**0.3184**	**0.8451**	1.0

Table 6: Evaluation of Example-short-document 6.

Example-short-document 7: Given the following source document and reference from the Bill-Sum dataset, Table 7 show result of Evaluation of Example-short-document 7. In bold is the top 2 score for each metric, and the minimum factual consistent fine-tuned model:

- **Source Document** -

  SECTION 1. SHORT TITLE. This Act may be cited as the Medicare Common Access Card Act of 2017". SEC. 2. blueMEDICARE SMART CARD PILOT PROGRAM. Part E of title XVIII of the Social Security Act is amended by inserting after section 1866E the following new section: SEC. 1866F. SMART CARD PILOT PROGRAM. (a) Implementation.– (1) In general.–Not later than 36 months after the date of the enactment of this section, the Secretary shall establish a pilot program (in this section referred to as the pilot program') to demonstrate the feasibility of using smart card technology under this title. (2) Smart card technology defined.–In this section, the term smart card technology' means the following: (A) Beneficiary smart card.–A machine readable, fraud- and tamper-resistant card (in this section referred to as a smart card') that includes an embedded integrated circuit chip with a secure micro- controller that enables the verification and secure, electronic authentication of the identity of a Medicare beneficiary at the point of service through a combination of the smart card and a personal identification number known by or associated with such beneficiary. (B) Card reader technology.–Information technology that enables a supplier and provider to authenticate the identity of a Medicare beneficiary through presentation of such a smart card and such components, with such authentication to be reflected through the use of a modifier or in another appropriate manner, as determined by the Secretary, in the claims adjudication process. (3) Program design elements.–The pilot program shall be conducted for a period of 3 years consistent with the following: (A) Selection of area.–In consultation with the Inspector General of the Department of Health and Human Services, the ... ...

- **Reference** -
  Medicare Common Access Card Act of 2017 This bill requires the Centers for Medicare & Medicaid Services (CMS) to establish a pilot program that demonstrates the feasibility of using smart card technology to address Medicare fraud. Under the program, smart card technology must be issued free-of-charge to selected Medicare beneficiaries, suppliers, and providers; such technology must support the secure, electronic authentication of beneficiary identity at points of service. In selecting program participants, the CMS must consider the risk of fraud, waste, or abuse among categories of suppliers and providers.

- **Generated summary**: The generated summary for each pretrained model:

M_1 - Part E of title XVIII of the Social Security Act is amended by inserting after section 1866E the following new section: SEC. 1866F. The pilot program shall be conducted for a period of 3 years consistent with the following: (A) Selection of area. (B) Card reader technology.

M_2 - This Act may be cited as the Medicare Common Access Card Act of 2017" SEC. 2. MEDICARE SMART CARD PILOT PROGRAM. (a) Implementation. (1) In general. ... ... the ... ... of ... the Department of Health and ...

M_3 - President Donald Trump signs into law the Medicare Smart Card redPilot Act of 2017.

M_4 - Part E of title XVIII of the Social Security Act is amended by inserting after section 1866E the following new section: SEC. 1866F.$< n >$The Secretary shall establish a pilot program to demonstrate the feasibility of using smart card technology under this title.$< n >$The pilot program shall be conducted for a period of 3 years consistent with the following: (A) Selection of area.–In consultation with the Inspector General of the Department of Health and Human Services, the ...

M_5 - President Trump has signed the Medicare Common Access Card Act of 2017 into law.

M_6 - (2) Smart card technology defined.–In this section, the term smart card technology' means the following: (A) Beneficiary smart card.–A machine readable, fraud- and tamper-resistant card (in this section referred to as a smart card') that includes an embedded integrated circuit chip with a secure micro- controller that enables the verification and secure, electronic authentication of the identity of a Medicare beneficiary at the point of service through a combination of the smart card and a personal identification number known by or associated with such beneficiary.

M_7 - (2) Smart card–A machine readable, and tamper-resistant card (in this section referred to as a smart card') that includes a microchip embedded with a secure micro-controller that enables the verification and secure electronic authentication of the identity of a beneficiary, at the point of adjudication through a combination of the smart card and such components, with the authentication to be reflected through the use of a modifier or in another appropriate manner, as determined by the beneficiary in the adjudication process.–The pilot program shall be conducted for a period of 3 years with the following: (A) Selection of area.–In consultation with the Inspector General of the Department of Health and Human Services, the ... the ... ...

M_8 - A bill has been signed into law by the President to:

M_9 - The Medicare Common Access Card Act of 2017 has been passed by the House of Health and Human Services. The bill, which includes a "smart card" that includes an embedded integrated circuit chip with a secure micro- controller that enables the verification and secure, electronic authentication of the identity of a Medicare beneficiary at the point of service through a combination of the smart card and a personal identification number known by or associated with such beneficiary. Smart card technology defined as a machine readable, fraud- and tamper-resistant card (in this section referred to as a smart card') that includes a personal ID number and a card reader technology

Model	ROUGE-1	ROUGE-2	ROUGE-3	ROUGE-L	CHRF-1	Meteor	BertScore	FactCheck
M_1	0.2172	0.0365	0.0184	0.1176	0.1644	0.0837	0.8193	1.0
M_2	0.2512	0.078	0.0493	0.1739	0.1212	0.0893	0.8095	1.0
M_3	0.0851	0.0323	0.0109	0.0638	0.0625	0.0214	**0.8308**	**0.95**
M_4	0.3557	**0.1036**	**0.0643**	0.2213	0.2801	0.1285	0.829	1.0
M_5	0.0957	0.0645	0.0543	0.0745	0.0887	0.034	**0.8348**	1.0
M_6	0.313	0.0846	0.0543	0.1756	0.2996	0.1306	0.816	1.0
M_7	**0.4164**	0.0756	0.0208	**0.2321**	**0.3196**	**0.1764**	0.8209	1.0
M_8	0.0541	0.0	0.0	0.0432	0.0326	0.0188	0.813	1.0
M_9	**0.3592**	**0.1418**	**0.0929**	**0.2324**	**0.3501**	**0.1418**	0.827	1.0

Table 7: Evaluation of Example-short-document 7.