SUMPUBMED: Summarization Dataset of PubMed Scientific Articles Appendix

Anonymous ACL-IJCNLP submission

A Hyper-parameters

In this section we provide the hyper-parameters we used for the seq2seq model in Table 1.

Hyper-parameter	Value
LSTM Hidden state size	256
Word embedding dimensions	128
Batch Size	16
encoder steps training	100-1000
encoder steps testing	100-4000
decoder steps length	100-250
beam size	4
learning rate for adagrad	0.15
maximum gradient norm	2.0

Table 1: Hyper-parameters for $seq2seq$ models

We utilized tensorflow package [1] for models and ROUGE evaluation package `pyrouge` [2] for the evaluation metric.We use a single $GeForce\ GTX\ TITAN\ X$ with 12GB GPU memory taking on average 5 to 6 days per model for model training.

B *SAX* vs *DOM* parser:

In *SAX*, events are triggered when the *XML* is being parsed. When the parser is parsing the *XML* and encounters a tag starting (e.g., $< something >$), then it triggers the *tagStarted* event (actual name of the event might differ). Similarly, when the end of the tag is met while parsing ($< /something >$), it triggers *tagEnded*. Using a *SAX* parser implies one needs to handle these events and make sense of the data returned with each event. One could also use the *DOM* parser,[3] where no events are triggered while parsing. In *DOM* the entire *XML* is parsed, and a *DOM* tree (of the nodes in the *XML*) is generated and returned. In general, *DOM* is easier to use but has a huge *overhead* of parsing the entire *XML* before one can start using it; therefore, we use *SAX* instead.

[1] https://www.tensorflow.org/
[2] https://pypi.org/project/pyrouge/
[3] https://tinyurl.com/py6qxzc

C Attention Visualization for SUMPUBMED

The example below shows a reference summary that originally accompanied the document, along with the system generated summary. We can visualize the attention projection by highlighting the respective words in yellow on the source document while producing a word. Figures 1 and 2 show the words in green with high generation probability, i.e, pgen ¿ 0.5 (not copied), non marked words have pgen ¡ 0.5 (mostly copied).

Observations about attention visualization While producing a word in the output, we can visualize the respective words in the source document on which the network is focussing. The darker the green highlight over a word in the summary, the higher is the pgen prob- ability. E.g., there is a chance that pgen is high whenever a new sentence is started after a period (.). The model generally focuses on two or three words at a time. There is a high chance that the summary starts with a noun phrase or a noun. For example, we can see in Figure 1 that the summary starts with name (noun) 'kevin pietersen'.

D Summarization Eample on CNN/DailyMail Dataset

Here also we see factual redundancy and repetitiveness in the generated summaries with pointer-generation which is removed by applying coverage.

D.1 CNN/DailyMail Dataset

In this example Factual Redundancy is shown with the fact that is being repeated presented in bold:

Article

it 's the picture some england cricket fans have been waiting to see and others have been equally dreading : kevin pietersen back at surrey . the 34-year-old returned to nets on monday for the first time since __re-signing__ for the county last month . he arrived early for the session at the oval - tweeting a picture of the pitch with the caption : ` in the office today . # oval ' - before team-mates such as gareth batty and jade __dernbach__ followed him in . kevin pietersen is pictured leaving the oval for the first time since resigning for surrey last month . pietersen returned to nets at surrey on monday and left the oval after training finished just before 2pm . pietersen was pictured driving away from the oval in his expensive __telsa__ sports car . pietersen managed a wry smile as he drove away after training on monday afternoon . pietersen was later pictured leaving the ground just before 2pm and is expected to __step-up__ his county rehabilitation with a three-day warm-up against oxford __mccu__ on april 12 . ultimately , pietersen is hoping to impress enough for surrey to earn a __re-call__ to the england side - possibly for this summer 's ashes rematch - having been sacked by the national side in 2014 . england left for the west indies for their upcoming test series on thursday , with coach peter moores leaving kp in no doubt that he still has a lot to prove - despite incoming england and wales cricket board chairman colin graves appearing to extended an olive branch to the exiled batsman . asked at gatwick about pietersen 's situation , moores said : ` from my point of view , kevin is n't on the radar . '

Reference summary

kevin pietersen took part in a net session at the oval on monday . he is expected to play in three-day game against oxford __mccu__ on april 12 . pietersen has returned to county game to boost chances of england recall .

Generated summary (highlighted = high generation probability)

kevin pietersen returned to nets on monday for the first time since resigning for surrey last month . he returned to nets at surrey on monday and left the oval after training on monday . pietersen is hoping to impress enough for surrey to earn a re-call to the england side .

Figure 1: Attention Probability for decoding on DUC 2001 dataset example, showing the summary is more inclined to an extractive nature. Attention corresponding to the word 'pietersen' present in the generated summary is shown.

Article

in line with these results , pet studies using transient reduction of tinnitus by lidocaine also revealed significantly increased __rcbf__ in __temporoparietal__ cortical activity during tinnitus perception . regarding cortical excitability measures , significantly enhanced intracortical facilitation of the motor cortex , was found in tinnitus patients using transcranial magnetic stimulation . single sessions of rtms were applied at high frequencies and resulted in a __short-lasting__ but significant improvement , whereas low frequencies have been used for approximately 5 - or 10-day treatment trials and showed a long-lasting reduction in symptoms . comparison of the effect of high - and low-frequency rtms showed that brief high frequency rtms has no effect , whereas prolonged low frequency rtms has a significant effect on tinnitus . , chronic tinnitus __sufferers__ showed surprisingly , that both the high and low-frequency rtms applications were effective . the largest double-blind parallel study compared the effects of different frequencies of rtms -RRB- , given daily over the left __temporoparietal__ cortex for weeks . preconditioning the temporal cortex with high-frequency rtms before low-frequency stimulation did not result in more pronounced effects . recently a specific rtms paradigm , namely __theta-burst__ stimulation was developed to modulate human primary motor cortex excitability . recently , it has been demonstrated that rtms applied in bursts of five pulses at hz repeated at hz over the auditory cortex has significantly stronger effects on narrow __band/white__ noise tinnitus than tonic hz stimulation . the aim of the current study was to investigate the effects of all three tbs paradigms in a randomized , __single-blinded__ cross-over design on tinnitus perception in patients with chronic tinnitus . on the basis of previous reports regarding the use of conventional low - and high-frequency rtms in tinnitus we hypothesized that single sessions of 40 -- sec tbs would also be able to produce a transient attenuation of tinnitus perception . this hypothesis was supported by a recent report that tbs results in comparable __after-effects__ on m excitability when compared with conventional high - and low-frequency rtms , yet being still more applicable for blinded studies and having a protocol of much shorter duration . the non-parametric friedman anovas , calculated for all the patients for every time point separately , also showed no significant effect of stimulation . wilcoxon matched pairs tests calculated for each tbs protocol separately , resulted in a significant difference only in case of ctbs between baseline and the time point immediately after the stimulation fig in the present study we could not find any significantly different effect on tinnitus perception for the different types of tbs applied to the inferior temporal cortex , either at the lower intensities of 80 % amt , nor at the higher intensities of 80 % rmt . the intensity of the stimulation also did not significantly differ between the two groups that may indicate that the observed slight effects are not intensity dependent , and that the __loudness__ of the noise evoked by the stimulation did not influence the patients . the first possible explanation is that tbs had no effect in our study over the temporal cortex because it could not reach the __tinnitus-related__ areas or was not sufficient to induce excitability changes in these areas . we chose to stimulate all our patients on the left side of the head , over the t __eeg-electrode__ position , irrespective of their tinnitus - affected side , as the primary studies reported positive effects on tinnitus after rtms over t or very close to it . however , even this enhanced stimulation intensity did not result in better effects on tinnitus perception . stimulation of the temporal cortex with tbs at rmt or above , or using a higher number of impulses was regarded as __unsafe__ by our own safety guidelines , and due to the need for clear safety limits for tbs , safety limits of conventional rtms should also be applied . if tbs applied over the left inferior temporal cortex was actually not effective on tinnitus , we should consider that all of our non-significant but not negligible observed effects were caused by the placebo effect . it is important to mention that the placebo effect is high in most of the clinical rtms studies , regardless of the paradigm used . still , with the exception of huang and colleagues , who published the first series of tbs experiments on the motor cortex and stated that __imtbs__ has no effect , there has been no other study , which has confirmed this . in a recent study we found , that __imtbs__ applied over the primary somatosensory cortex has a significant effect on the n component of the __laser-evoked__ potential , but not the sham protocol . therefore , another possible explanation as to why tbs had no significant effect on tinnitus in our study may be that there was no adequate placebo condition ; which is another limitation of our study . the results of the experiments using single trains of tbs suggest that in the human motor cortex tbs produces a mixture of __facilitatory__ and inhibitory effects on synaptic transmission . it is possible that the difference in effectiveness observed between tbs protocols on motor and sensory cortices could be due to differences in the physiological and functional states of the stimulated cortex . furthermore , several studies have shown that both low - and high-frequency rtms reduce tinnitus indicating that tms effects on motor cortex excitability are different from tms effects on tinnitus perception . one session of rtms has only very __short-lasting__ effects on tinnitus perception . furthermore women experience greater suppression of their tinnitus with burst stimulation than men and since we had only two women , it could influence our results . our study design and results do not allow us to draw __conclusions__ about the neuronal mechanisms of tms on the temporal cortex , but may show that the effects of tms on tinnitus are not directly mediated by tms induced modulation of excitability in the stimulated cortical area . it is important to note that in previous studies using high-frequency suprathreshold rtms , the improvement in tinnitus was observed by about 42 -- 68 % of the stimulated patients . according to the recent results of rtms applied in alpha - , beta - , and __theta-bursts__ , new types of burst stimulation protocols may be more effective in tinnitus .

Reference summary

although half of the patients reported a slight attenuation of tinnitus perception , group analysis resulted in no significant difference when comparing the three specific types of tbs . in addition there was no significant difference when comparing the responder and !!__non-responder__!! groups regarding their !!__anamnestic__!! and !!__audiological__!! data . repetitive transcranial magnetic stimulation over the __temporoparietal__ cortex was recently introduced to modulate tinnitus perception . changes in subjective tinnitus perception were measured with a numerical rating scale . patients received pulses of continuous tbs , intermittent tbs and intermediate tbs over left inferior temporal cortex with an intensity of 80 % of the individual active or resting motor threshold . in the current study , the effect of __theta-burst__ stimulation , a novel rtms paradigm was investigated in chronic tinnitus . cortical excitability changes as well as imbalances in excitatory and inhibitory circuits play a distinct pathophysiological role in chronic tinnitus . tbs applied to inferior temporal cortex appeared to be safe . twenty patients with chronic tinnitus completed the study . the tq score correlated significantly with the vas , lower __loudness__ indicating less tinnitus distress .

Generated summary (highlighted = high generation probability)

the effect of the second month of the indirect brain barrier for the medial edge of the medial edge confirms the importance of medial prefrontal cortex and evoked potentials . the intensity of tms induced modulation of tinnitus . and lidocaine motion were observed in patients with painful subjective development . we investigated the effects of all three tbs paradigms in a randomized , single-blinded cross-over design . the aim of this study was to investigate the neuronal mechanisms of tms on the temporal cortex of tinnitus perception in patients with chronic tinnitus perception . in this study , we investigated the effects of the temporal cortex with high-frequency suprathreshold rtms on motor cortex excitability and functional states of the stimulated cortical area tbs at hz over the left inferior temporal cortex , and compared to the inferior frontal cortex , and then subjected to the placebo group . the placebo effect was evaluated using single trains of tbs , using high-frequency suprathreshold rtms as a mixture of the n component of the stimulated cortical area . the results of the present study suggest that tms effects on tinnitus after low-frequency stimulation than men did not differ in the physiological and functional states of the stimulated cortical area , in the present study , we investigated the effects of rtms on the left side of the somatosensory cortex and over the left inferior frontal gyrus . we found that the observed effects of rtms resulted in a significant

Figure 2: Attention Probability for decoding on a PubMed example where the attention corresponding to word 'present' in the generated summary is shown.

Reference Summary maricopa county sheriff 's office in arizona says robert bates never trained with them. " he met every requirement , and all he did was give of himself, "his attorney says. tulsa world newspaper: three supervisors who refused to sign forged records on robert bates were reassigned.

Summary from seq2seq some supervisors at the tulsa county sheriff's office were told to forge reserve deputy robert bates ' training records. some supervisors at the tulsa county sheriff's office were told to forge reserve deputy robert bates' training records, and three who refused were reassigned to less desirable duties. **some supervisors at the tulsa county sheriff 's office were told to forge reserve deputy robert bates ' training records.**

Summary from seq2seq with coverage some supervisors at the tulsa county sheriff 's office were told to forge reserve deputy robert bates ' training records . the volunteer deputy 's records had been falsified emerged " almost immediately " from multiple sources after bates killed eric harris on april 2 . bates claims he meant to use his taser but accidentally fired his handgun at harris instead .

E Example of Front, Body, and the *XML*

Front part of the example document 'test.txt'

Background

Recently there has been increased interest in pancreatic cholesterol esterase due to correlation between enzymatic activity in vivo and absorption of dietary cholesterol.

Results

Our analysis indicates that the current set of nearest neigh-bough energy parameters in conjunction with the Mfold folding algorithm are unable to consistently and reliably predict an RNA's correct secondary structure.

Conclusion

We are the first to report that the acyl chain binding site of cholesterol esterase shows stereoselectivity for the four diastereomers of 1.

Body part of the example document 'test.txt'

Background

There has been increased interest in pancreatic cholesterol esterase (CEase, EC 3.1.1.13) due to correlation between enzymatic activity in vivo and absorption of dietary cholesterol [1,2]. Figure 2 Structures of the four diastereomers of carbamates 1 and two atropisomers of 2.

Results

The inhibition data for CEase by the four diastereomers of 1 and the two enantiomers of 2 are summarized (Table 1). The stereochemical preference of CEase for the binaphthyl moiety of 1 (R > S, ca. 10 times) is the same as that for 2 [20,22]. The stereoselectivity of CEase for the α-methylbenzyl moiety of 1 is also the R-form (2-3 times over S-form).

Table 1. Inhibition constants for CEase-catalyzed hydrolysis of PNPB in the presence of the four diastereomers of 1 and the two enantiomers of 2

Inhibitor	Ki (μM)	K2 (10-3s-1)	Ki (103 M-1s-1)
(1R, αR) - 1	0.20 ± 0.01	2.0 ± 0.2	10.0 ± 1
(1R, gαS) - 1	0.50 ± 0.03	2.0 ± 0.2	4.0 ± 0.4

Conclusion

The enzyme stereospecificity toward the 1, 1'-bi-napthyl moiety of the inhibitors is the R-form and is the same as that for 2.

Acknowledgement

The authors thanked the National Science Council of Taiwan for financial support.

References

Hui Dy Molecular biology of enzymes involved with cholesterol esterase hydrolysis in mammalian tissues Biochim Biophys Acta 1996 1303 1 14 8816847

Lopez-Candales A Bosner MS Spilburg CA Language LG Cholesterol transport function of pancreatic cholesterol esterase: directed sterol uptake and esterification in Enterocytes Biochemistry 1993 32 12085 12089 8218286 10.1021/bi00096a019

Brockerhoff H Jensen RG Cholesterol esterase esterase Lipolytic Enzymes 1974 New York: Academic Press

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XML format for example document 'test.txt'

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            Recently, there has been increased interest in pancreatic cholesterol esterase due to correlation between enzymatic activity in vivo and absorption of dietary cholesterol.
            </background>
            <results>
            Our analysis indicates that the current set of nearest neighbour energy parameters in conjunction with the mfold folding algorithm are unable to consistently and reliably predict an rna's correct secondary structure.
            </results>
            <conclusions>
            We are first to report the acyl chain binding of cholesterol esterase due to correlation between enzymatic activity in vivo and absorption of dietary cholesterol <cit>.
            </conclusion>
        </abstract>
        <text>
            <background>
            Recently, there has been increased interest in pancreatic cholesterol esterase due to correlation between enzymatic activity in vivo and absorption of dietary cholesterol <cit>.
            </background>
            <results>
            The inhibition data for cease by the four diastereomers of <dig> and the two enantiomers of <dig> are summarized. The stereochemical preference of cease for the binaphthyl moiety of <dig> is the same as that for <dig> <cit> . the stereoselectivity of cease for the \xce\b1-methylbenzyl moiety of <dig> is laos the r-form.
            </results>
```

<conclusions>
The enzyme stereospecificity toward the <dig> 1\'-bi-2-naphthyl moiety of the inhibitors is the r-forms and is the same as that for the <dig>.
</conclusions>
</text>
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