UNIVERSITAT DE BARCELONA

Treball final de grau

GRAU D'ENGINYERIA INFORMÀTICA

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Using Large Language Models to Summarise Scientific Papers

Supplementary Materials

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Contents

Chapter 1

Paper A:
An inverse medium problem using Stekloff eigenvalues and a Bayesian approach

This paper can be read for free on arXiv [5]. This is the corresponding targeted text:

"this paper studies the reconstruction of stekloff eigenvalues and the index of refraction of an inhomogeneous medium from cauchy data .the inverse spectrum problem to reconstruct stekloff eigenvalues is investigated using a new integral equation for the reciprocity gap method .given reconstructed eigenvalues , a bayesian approach is proposed to estimate the index of refraction .moreover , since it is impossible to know the multiplicities of the reconstructed eigenvalues and since the eigenvalues can be complex , we employ the recently developed spectral indicator method to compute stekloff eigenvalues .numerical experiments validate the effectiveness of the proposed methods ."

Below are presented the outputs generated by the models.

1.1 facebook/bart-large-cnn

Pre-Train:
"In inverse scattering problems for inhomogeneous media have many applications such as medical imaging and nondestructive testing. In this paper, the inverse spectrum problem to reconstruct the stekloff eigenvalues from cauchy data is investigated first using a new integral equation for the reciprocity gap method. These eigen values are used to estimate the index of refraction of the inhomogenous medium."

Fine-Tuned:
"in this paper , the inverse spectrum problem to reconstruct the stekloff eigenvalues from cauchy data is investigated first using a new integral equation for the reciprocity gap method .then these eigenvalue are used to estimate the index of refraction of the inhomogeneous medium .due to the lack of knowledge of the relation between stek loff eigens and the index , we propose a bayesian approach .since the eigen values are complex for absorbing media and the multiplicities are not known , the recently developed spectral indicator method is employed to compute the stkloff"

1.2 google/pegasus-large

Pre-Train:
"Title: An inverse medium problem using Stekloff eigenvalues and a Bayesian approach Domains: Mathematics introduction: inverse scattering problems for inhomogeneous media have many applications such as medical imaging and nondestructive testing .in this paper , the inverse spectrum problem to reconstruct the stekloff iigenvalues from cauchy data is investigated first using a new integral equation for the reciprocity gap method .then these eigenvalue are used to estimate the index of refraction of the inhomo geneous medium .due to the lack of knowledge of the relation between steklof eigen values and the index o refraction , we propose a bayesian approach .since theeigenvalues are complex for absorbing media and the multiplicities are not known ., the recently developed spectral indicator method is employed to compute the stekoff eigvalues .the reconstruction of certain eigengraphs from the scattering data has been studied by many researchers . in the context of qualitative methods in inverse scattering , it has been shown that interior eigenValues such as dirichlet eigenvaluation and transmission eigenvalued can be determined from the scattered data (see also the special issue edited by lechleiter and sun) .a related method , which can be used to compute interior eighvalues using the scattering information , is the inside - outside duality .given reconstructed eigvalue ."

Fine-Tuned:
"the inverse scattering problem for inhomogeneous media has many applications such as medical imaging and nondestructive testing .in this paper , the inverse spectrum problem to reconstruct the stekloff eigenvalues from cauchy data is investigated first using a new integral equation for the reciprocity gap method .then these eigen values are used to estimate the index of refraction of the inhomogenous medium .due to the lack of knowledge of the relation between stekloffs eigenvalue and the index refraction , we propose a bayesian approach ."

1.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"the inverse spectrum problem for inhomogeneous media has many applications such as nondestructive , imaging and medical testing.in this paper stekloff eigenvalues associated with the scattering obstacle problem<n> are investigated first using a new integral equation for the reciprocity gap method .<n> then these eigen values are used to estimate the index of refraction of the inhomogenous medium . due to the lack of knowledge of the relation between stekl off eigenvalue and theindex of refraction , we propose a bayesian approach ."

Fine-Tuned:
"The inverse spectrum problem to reconstruct the Stekloff eigenvalues from Cauchy data is investigated first using a new integral equation for the reciprocity gap method. In this paper, a Bayesian approach is proposed to estimate the index of refraction of the inhomogeneous medium. Due to the lack of knowledge of the relation between Stekloff eigenvalues and the index of refraction, we propose a Bayes approach. Since the eigenvalues are complex for absorbing media and the multiplicities are not known, the recently developed spectral indicator method is employed to compute the Stekloff $e_{igenvalues}$*. Hence the reconstruction of the Stekloff* e_{k_n} *values."*

1.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

1.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"based on the spectral indicator method .the proposed method has been applied to the inverse problem of reconstructing the refractive index of a non - absorb ing medium .\n\nmethodology: the proposed method is based on an integral equation for the rg method .this equation can be solved using a numerical method such as the finite difference method or the finite element method.the solution of the integral equation is then used to determine the eigenvalues and eigenfunctions of the medium.the inverse problem is formulated as a maximum likelihood estimation problem , where the likelihood function is defined as the product of the solution and the inverse of the covariance matrix of the data .a Bayesian method is used to incorporate prior knowledge about the unknown parameters.the prior distribution is assumed to be a normal distribution with a known mean and variance.the posterior distribution is obtained by integrating the prior distribution over all possible realizations of the random variables.the Bayes factor is then computed as the ratio of the posterior probability to the prior probability.the method is validated by comparing the results obtained using the proposed approach with those obtained using other methods for the same inverse problem.the results show good agreement between the two methods.the proposed approach can be applied to a wide class of inverse problems involving the inverse medium spectrum problem.in particular , it can be useful for the inverse problems of determining the refraction index of an absorbing medium and the transmission eigenvalues of an inhomogenous medium.conclusion: this paper introduces a new method for solving inverse medium spectra problems using the Steklov eigenvalue method and the Bayesian framework.it is shown that this method can reconstruct steklov eigenvalues from

far-field data and can also reconstruct transmission eigenvalues.the approach has been successfully applied to inverse problems for determining refraction indices of absorbing and non-absorbing media.further work is needed to extend the method to other inverse problems and to improve the accuracy and efficiency of the method."

Fine-Tuned:
"to estimate the index of refraction of the inhomogeneous medium .the rg method has been used to reconstruct stekloff eigenvalues from scattering data for absorbing media in .the rg method has also been used to reconstruct stekloff eigenvalues from scattering data for non - absorbing media in .in this paper , the rg method is extended to reconstruct stekloff eigenvalues from scattering data for inhomogeneous non - absorbing media .the rg method has been used to reconstruct stekloff eigenvalues from scattering data for absorbing media in .the rg method has also been used to reconstruct stekloff eigenvalues from scattering data for non - absorbing media in "

1.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: An inverse medium problem using Stekloff eigenvalues and a Bayesian approach using a new integral equation for the reciprocity gap method .in this paper , the recently developed spectral indicator method is employed to compute the stekloffs and obtain useful information of the index of refraction of the inhomogeneous medium .in the context of qualitative methods in inverse scattering , it has been studied by many researchers .introduction: inverse scattering problems for inhomogenous media have many applications such as medical imaging and nondestructive testing .the reconstruction of the inverse spectrum problem is investigated first using a different method .then the problem is reconstructed using a spectral indicator .the problem to reconstruct the Stekler eigenvalue from cauchy data .then these eigen values are used to estimate the indexOf refraction .due to the lack of knowledge of the relation between stekler and the multiplicities are not known , we propose a bayesian approach .since the Eigenvalues are complex for absorbing media and the multiplying multiplicity is unknown , a new method is used to calculate the indexof refraction using the spectral indicator.Summarized the following academic article and created the abstract .Title: AN inverse medium Problem using Eigenvalue.introduction : inverse scattering problem has many applications .for example , a legitimate question is what information about the obstacle can be obtained .for inhomhetical non - absorbing media , transmission eigen Values have been used to reconstruct shape of the obstacle and obtain using information of their size) .however , the use of transmission eigvalues has two drawbacks : 1) multi - frequency data are necessary ; and 2) only real transmission eIGvalues can be determined from the scattering data so far .it has been shown that steklet eigenwords associated with the scattering problem can be compared with the far field data of a single frequency ... .unlike transmission iigenvalues , steklfoff eigelsevalues exist for absorbing medias as well .hence the useof stekaloffeigenvalues avoids the above two drawbacks and has the potential to work for a wider class of problems .a related method , which can be used to compute interior eigenlies using the scattering .the inside - outside duality .given reconstructed eigenvotes , a valid question"

Fine-Tuned:
"in this paper , a new integral equation for the reciprocity gap(rg) method is introduced to

determine stekloff eigenvalues associated with the scattering problem can be determined from far field data of a single frequency .then these eigenvectors are used to estimate the index of refraction of the inhomogeneous medium .due to the lack of knowledge of the relation between steklowe and refraction , we propose a bayesian approach .since the eigenvalue multiplicities are not known for absorbing media , the recently developed spectral indicator method is employed to compute the steklоffeigenvalues and a Bayesian approach is proposed to compute them from cauchy data .we propose a new Bay"

Chapter 2

Paper B: $\mathcal{PT}$ -symmetric deformations of Calogero models

This paper can be read for free on arXiv [1]. This is the corresponding targeted text:

"we demonstrate that coxeter groups allow for complex pt - symmetric deformations across the boundaries of all weyl chambers .we compute the explicit deformations for the a_2 and g_2-coxeter group and apply these constructions to calogero - moser - sutherland models invariant under the extended coxeter groups .the eigenspecta for the deformed models are real and contain the spectra of the undeformed case as subsystem ."

Below are presented the outputs generated by the models.

2.1 facebook/bart-large-cnn

Pre-Train:
"The study of pseudo - hermitian hamiltonian systems has attracted a considerable amount of attention in the last few years. One of the main reasons for the popularity of these types of hamiltonians is the fact that they possess real eigenvalue spectra. These are interesting candidates for a new sort of stable physical systems overlooked up to now."

Fine-Tuned:
"the study of pseudo - hermitian hamiltonian systems has attracted a considerable amount of attention in the last few years .for recent reviews and special issues devoted to this topic see .one of the main reasons for the popularity of these types of hamiltonians is the fact that they possess real eigenvalue spectra , despite of being non - hermitsian , and therefore constitute interesting candi-

dates for a new sort of stable physical systems overlooked up to now .in this paper we discuss the possibility of extending such models by adding PT -symmetric terms to it or by deforming existing terms in a"

2.2 google/pegasus-large

Pre-Train:
"Title: PT-symmetric deformations of Calogero models Domains: Mathematics introduction: the study of pseudo - hermitian hamiltonian systems has attracted a considerable amount of attention in the last few years .for recent reviews and special issues devoted to this topic see .one of the main reasons for the popularity of these types of hamiltonians is the fact that they possess real eigenvalue spectra , despite of being non - hermitIAN , and therefore constitute interesting candidates for a new sort of stable physical systems overlooked up to now .alternatively to using the concept of pseudo \u2013 hermiticity or quasi - hermiticity , one may equivalently explain the reality of the spectrum of some non - Hermitian hamiltonians when one encounters unbroken inlineform0 -symmetry , which in the recent context was first pointed out in .unbroken specifies that both the Hamiltonian and the wavefunction remain invariant under a simultaneous parity transformation inlineform1 and time reversal inlineform2 .when acting on complex valued functionsthe anti - linear operator inlineform3 is understood to act as complex conjugation .these observations can be exploited in the construction of new interesting models with real Eigenvalue Spectra when taking previously studied hermitian examples as starting points .the above statements imply that one has two possibilities at hand . one could either employ pseudo - Hermiticity ., which involves the usually technically difficult task to construct a meaningful metric , e.g."

Fine-Tuned:
"the study of pseudo - hermitian hamiltonian systems has attracted a considerable amount of attention in the last few years .for recent reviews and special issues devoted to this topic see .one of the main reasons for the popularity of these types of hamiltonians is the fact that they possess real eigenvalue spectra , despite of being non - hermitIAN , and therefore constitute interesting candidates for a new sort of stable physical systems overlooked up to now .alternatively to using the concept of pseudo \u2013 hermiticity or quasi - hermiticity , one may equivalently explain the reality of the spectrum of some non \u2013 hermitian ( ) Hamiltonians when one encounters unbroken inlineform0 -symmetry , which in the recent"

2.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"the aim of this paper is to present a procedure for constructing calogero models with real eigenvalue spectra by means of a deformation of a pseudo - hermitian hamiltonian in such a way that the resulting model is genuinely deformed in a inlineform -symmetric manner ."

Fine-Tuned:
"we construct a new class of calogero models with real eigenvalue spectra , when adding a set of @xmath0-symmetric terms to the previously known models .the construction is based on the idea of

pseudo - hermiticity , which allows one to construct models in a very transparent and simple way , at least on the level of the hamiltonian .in this way one can easily see that the models are genuinely deformed in a simple inlineform -symmetric manner ."

2.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

2.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"hamiltonians .in this paper we extend this construction principle to the case of inlineform 11 - symmetric systems .the main result of this paper is the derivation of a set of linear differential equations for the eigenvalues and eigenfunctions of the extended system .in particular, we show that this set of equations can be written in the form of a linear differential equation of the first kind , which can be solved by means of standard methods in the theory of linear partial differential equations .in addition, we provide a detailed analysis of the properties of the eigenvectors and eigenvalues of the linearized system and discuss their physical implications.the paper is organized as follows.in section 2 we introduce the basic concepts and notation used in this paper.section 3 is devoted to the construction and analysis of a family of linearly independent solutions to the set of differential equations derived in section 1.in sections 4 and 5 we discuss the physical properties of these solutions and their relation to the eigenvalue and eigenfunction spectra of the original calogoer model.conclusion and outlook are presented in the final section.the appendix contains some technical details and auxiliary results used in the main part of the paper."

Fine-Tuned:
"symmetric terms to the inlineform11 -symmetric terms to the inlineform12 -symmetric terms to the inlineform13 -symmetric terms to the inlineform14 -symmetric terms to the inlineform15 - symmetric terms to the inlineform16 -symmetric terms to the inlineform17 -symmetric terms to the inlineform18 -symmetric terms to the inlineform19 -symmetric terms to the inlineform20 - symmetric terms to the inlineform21 -symmetric terms to the inlineform22 -symmetric terms to the inlineform23 -symmetric terms to the inlineform24 -symmetric terms to the inlineform25 -"

2.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: PT-PT-symmetric deformations of Calogero models for a non - hermitian hamiltonian model with an inlineform0 -symmetry , which in the context of the current activities in this field of research is a very transparent and simple principle , at least on the level of the hamiltonians is a simple way to construct a new sort of stable physical systems overlooked up to now .the following is the abstract of this scientific article:introduction: the study of pseudo - Hermitian (non - heritian) hamiltian systems has attracted a considerable amount of attention in the last few years .for recent reviews and special issues devoted to this topic see .one of the main reasons for the popularity of these types of hamiltonions is the fact that they possess real eigenvalue spectra , despite of being non - Heritian , and therefore constitute interesting candidates for a new kind of stable mathematical systems overlooked until now .alternatively to using the concept of pseudo _ hermiticity or quasi - HERmiticity .in the recent context one may equivalently explain the reality of the spectrum of some non - HERMITian hamiltians when one encounters unbroken inlineform1 and unbreakable inlineform2 .unbroken specifies that both the hamptonian and the wavefunction remain invariant under a simultaneous parity transformation inlineform4 and time reversal inlineform5 .when acting on complex valued functionsthe anti - linear operator inlineform3 is understood to act as complex conjugation .these observations can be exploited in the construction of new interesting models with real eigend spectra when taking previously studied hermitians examples as starting points .the above statements imply that one has two possibilities at hand .one could either employ pseudo _ - - - _ - _ , which involves the usually technically difficult task to construct the meaningful metric , e.g. or in contrast use inlineform04 - - symmetries , which involve the use of unbroken and simple principles .at least one of the above construction principle has been applied to a huge number of models , notably the harmonic oscillator in , which constitutes the starting point of the recent activities in the field ofresearch .the latter construction principle can be used to construct new interesting model with real Eigenvalue Spectra when starting with a parity invariant potential systemone may extend such type of models by adding inlineform6 -ishmmetric terms to it or by deforming existing terms in a inlineform7 -sympetric manner .in this context of calogero model such typeof extensions were first carried out in , by add inlineform8 -symetric termsto the inlineform9 and inlineform10 -calogeromodels .shortly afterwards an"

Fine-Tuned:
"the study of pseudo - hermitian hamiltonian systems has attracted a considerable amount of attention in the last few years .for recent reviews and special issues devoted to this topic see .one of the main reasons for the popularity of these types of hamiltonians is the fact that they possess real eigenvalue spectra , despite of being non - symmetrichamiltonian , and therefore constitute interesting candidates for a new sort of stable physical systems overlooked up to now .in this paper we show that such systems can be extended by using pseudo - symmetric deformations of calogero models .we show that these extensions can be carried out in a simple and transparent and simple manner when one encounters unbroken unbroken"

Chapter 3

Paper C: Robust Neural Machine Translation with Joint Textual and Phonetic Embedding

This paper can be read for free on arXiv [4]. This is the corresponding targeted text:

"neural machine translation (nmt) is notoriously sensitive to noises , but noises are almost inevitable in practice .one special kind of noise is the homophone noise , where words are replaced by other words with similar pronunciations .we propose to improve the robustness of nmt to homophone noises by 1) jointly embedding both textual and phonetic information of source sentences , and 2) augmenting the training dataset with homophone noises .interestingly , to achieve better translation quality and more robustness , we found that most (though not all) weights should be put on the phonetic rather than textual information .experiments show that our method not only significantly improves the robustness of nmt to homophone noises , but also surprisingly improves the translation quality on some clean test sets ."

Below are presented the outputs generated by the models.

3.1 facebook/bart-large-cnn

Pre-Train:
"The method proposed in this paper can generate correct results under such kind of noises , since it uses both textual and phonetic information. Since words are discrete signals , to feed them into a neural network , a common practice is to encode them into real - valued vectors through embedding. However , the output of the embedding layer is very sensitive to noises in the input sentences."

Fine-Tuned:
"we propose a new method of neural machine translation (nmt) , which uses both textual and phonetic embedding to translate words into their homophones .since words are discrete signals , to feed them into a neural network , a common practice is to encode them into real - valued vectors through embedding .however , the output of the embedding layer is very sensitive to noises in the input sentences .this is because when words are replaced by other words with similar pronunciations , which is common in real - world systems , it is very common for a user to accidentally choose a homophone instead of the correct word .the method proposed in this paper can generate correct results under such kind of noises , since it uses"

3.2 google/pegasus-large

Pre-Train:
"Title: Robust Neural Machine Translation with Joint Textual and Phonetic Embedding Domains: Computer science introduction: recently we witnessed tremendous progresses in the field of neural machine translation (nmt) especially the birth of transformer network .despite tremendous success , nmt models are very sensitive to the noises in input sentences .the causes of such vulnerability are multifold , and some of them are : 1)neural networks are inherently sensitive to noises , such as adversarial examples 2)every input word can affect every output word generated by the decoder due to the global effects of attention ,and 3) all nmt model have an input embedding layer , which is sensitive to sounds in the input sentences ....in this paper , we focus on homophone noise , where words are replaced by other words with similar pronunciations .which is common in real - world systems .one example is speech translation where an asr system may output correct or almost correct phoneme sequences , but transcribe some words into their homophones .another example is pronunciation - based input systems for non - phonetic writing systems such as pinyin for chinese or katakana / hiragana for japanese .it is very common for a user to accidentally choose a homophone instead of the correct word .existing nmt systems are also sensitive to homophone noises ."

Fine-Tuned:
"we propose a robust neural machine translation (nmt) with joint textual and phonetic embedding domains , which is sensitive to homophone noise , where words are replaced by other words with similar pronunciations .the method proposed in this paper can generate correct results under such kind of noises , since it uses both textual and phonetic information , to feed them into a neural network , a common practice is to encode them into real - valued vectors through embedding ."

3.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"in this paper , we study the problem of machine translation (nmt) sensitivity to homophone noises.neural networks are inherently sensitive to noises , such as adversarial examples and the input embedding layer is usually the first layer of the network , and errors from this layer are dramatic.to make things worse , input embedding is usually replaced by one of its homophones , which may generate a strange translation .<n> this paper proposes a method to generate correct results under such kind of noises using both phonetic information and inlineform ."

Fine-Tuned:
"in this paper , we propose a method to generate correct results under homophone noise , which is very common in real - world input systems such as speech translation and non - phonetic writing systems.in our method , words are encoded into a real - valued vector , and the output is used to generate a translation .to make things worse , the input embedding layer is usually the first layer of the network.to avoid this layer , a transformer model is developed .in the transformer model , phonetic information such as , subset ' is used , while word meanings are encoded in the embedding vector of the other word.to generate a correct result under such kind of noises "

3.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

3.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"vectors of inlineforms1 and 0 .to address this issue , we propose a joint textual-phonetic embedding layer .the joint embedding layer combines the textual embeddings of the input words with the phonetically encoded phonemes of the corresponding phonological units .the resulting embedding vectors are then fed into the nmt model .experiments show that the proposed method significantly improves the robustness of nmt under homophony noises compared to existing nmt methods ."

Fine-Tuned:
"vector of inlineform3 .in this paper , we propose a novel joint textual and phonetic embedding method for nmt , which is able to capture both textual and phonetic noises in the input sentences .the main contributions of this paper are : 1)we propose a novel joint textual and phonetic embedding method for nmt , which is able to capture both textual and phonetic noises in the input sentences .2)we conduct extensive experiments on the wmt 2014 and wmt 2016 shared task datasets , and show that our joint textual and phonetic embedding method significantly outperforms the state - of - the - art nmt models .3"

3.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: Robust Neural Ma-

chine Translation with Joint Textual and Phonetic Embedding with joint textual and phonetic embedding .the method proposed in this paper can generate correct results under such kind of noises , since it uses both textual and phonetic information .since words are discrete signals , to feed them into a neural network , a common practice is to encode them into real - valued vectors through embedding , thus results in dramatic changes .this is because when a word inlineform0 is replaced by another words inlineform1 with different meanings , the embedding vector of inlineform2 may be very different from the input encoding .to make things worse , the input embedding layer is usually the first layer of"

Fine-Tuned:
"we propose a method for robust neural machine translation (nmt) that uses both textual and phonetic embedding to generate correct results under homophone noise .existing nmt systems are very sensitive to homophone noises , where words are replaced by other words with similar pronunciations , which is common in real - world systems .the method proposed in this paper can generate accurate results under such kind of noises , since it uses a combination of textual and phonetic information .however , the output of the embedding layer is sensitive to noises in the input sentences .this is because when a word inlineform0 is replaced by another word with different meanings , the input embedding vector of inlineform2 may be very different from the"

Chapter 4

Paper D: A Cosmological Solution to Mimetic Dark Matter

This paper can be read for free on arXiv [7]. This is the corresponding targeted text:

"in this paper , a cosmological solution to mimetic dark matter (mdm) for an exponential potential is provided .then , a solution for the $0-i$ *perturbed einstein 's differential equation of mdm is obtained based on an exponential potential that satisfies inflation for some initial conditions .another general potential is suggested that incorporates inflation too .then , quantum perturbations are included .the constants in the model can be tuned to be in agreement with the amplitude fluctuation of the cosmic microwave background (cmb) radiation .finally , the spectral index is calculated for the suggested potentials .moreover , mdm is shown to be a viable model to produce dark matter , inflation , and cmb 's fluctuation ."*

Below are presented the outputs generated by the models.

4.1 facebook/bart-large-cnn

Pre-Train:
"mimetic dark matter is an interesting model because it 's a model that works not only on a cosmological scale , but also on a galactic scale after adding higher derivative terms that alter the speed of sound. The equations that result are similar to einstein 's equations of motion with an extra mode term that mimics cold dark matter even in the absence of normal matter."

Fine-Tuned:
"mimetic dark matter is a model that mimics cold dark matter even in the absence of normal matter .it is an interesting model because it works not only on a cosmological scale , but also on a galactic

scale after adding higher derivative terms that alter the speed of sound .for a spatially flat frw universe with metric , we obtain a solution to the differential equation (3) , which is the friedmann equation in the presence of ordinary matter .by multiplying equation (6) by
mathbbt and differentiating with respect to time , and substituting δ , α , and β , the solution is obtained , where α"

4.2 google/pegasus-large

Pre-Train:
"Title: A Cosmological Solution to Mimetic Dark Matter Domains: Physics introduction: a modification of general relativity was proposed in where a metric inlineform0 is defined by a scalar field inlineform1 and an auxiliary metric inlineforms2 displayform0the equations of motion that result are similar to einstein 's equations of movement with an extra mode term that mimics cold dark matter even in the absence of normal matter .mimetic dark matter is an interesting model because it 's a model that works not only on a cosmological scale , but also a model which works on a galactic scale after adding higher derivative terms that alter the speed of sound .for further discussion about mimetic dark Matter , degrees of freedom , and extensions check .consider the actions in , displayform1where inlineform3 is the lagrangian of general relativistic , inlineform4 is a potential ,and inlineform5 is the laggedrangian .by varying the action with respect to inlineform6 , lineform7 , or inlineform8 , taking the trace , equations (13) and (14) in are obtained .displayform0where inlineforms9 is the energy - momentum tensor .note that the normalization condition on the four - velocity inlineform10 is the normalizing condition (eqref3) .form0taking inlineform11 and calculating the time - time component of equation (3) is, which is the friedmann equation in the absent of ordinary matter (inlineform12) displayformwhere , mimeticdark matter appears as an integration constant in the right hand side of the equation , the solution for inlineform13 is the integration constant."

Fine-Tuned:
"a cosmological solution to mimetic dark matter domains is proposed in where a metric inlineform0 is defined by a scalar field inlineform1 and an auxiliary metric inline form2 displayform0the equations of motion that result are similar to einstein 's equations of motions with an extra mode term that mimics cold dark matter even in the absence of normal matter .mimetic darkmatter is an interesting model because it 's a model that works not only on a cosmological scale , but also works on a galactic scale after adding higher derivative terms that alter the speed of sound .consider the actions in , display form0where inlineform3 is the lagrangian of general relativity , inlineform4 is a potential , and inline"

4.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"mimetic dark matter is a model that works not only on a cosmological scale , but also on a galactic scale after adding higher derivative terms that alter the speed of sound ."

Fine-Tuned:

"mimetic dark matter is a model that works not only on a cosmological scale , but also on a galactic scale after adding higher derivative terms that alter the speed of sound .for further discussion , displayform0the model is defined by a modified lagrangian of matter and a potential .by varying the potential and the action , we find cosmological solutions for any given potential and find that the model works for any spatially flat frw universe ."

4.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

4.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"which gives displayform1 , which can be integrated to give displayform2 .displayform2 is the solution for the exponential form of the potential .by plugging this solution into displayform5 , we get displayform3 .this solution is valid for any value of the coupling constant , and for any choice of potential .by taking the limit of infinite coupling constant and infinite potential , we can obtain the general solution .the general solution is given by displayform4 , which has the same form as the exponential solution for a constant coupling constant .in summary , the mimestic dark matter model is a modification to the general theory of relativity that allows for the existence of a dark matter component that is mimicked by an additional mode in the metric .the model works on both the cosmological and galactic scales, and can be extended to accommodate a wider range of potentials and couplings.furthermore, the model can be tested through observations of the cosmic microwave background radiation and the large scale structure of the universe.overall, this model provides a viable alternative to the standard model of particle physics and cosmology, and has the potential to shed new light on the nature of dark matter and the universe as a whole."

Fine-Tuned:
"we obtain displayform0where inlineform21 and inlineform22 are constants , and inlineform23 is the scale factor .note that inlineform24 and inlineform25 are related by inlineform26 , displayform0where inlineform27 and inlineform28 are constants , and inlineform29 and inlineform30 are constants , and inlineform31 and inlineform32 are constants , and inlineform33 and inlineform34 are constants , and inlineform35 and inlineform36 are constants , and inlineform37 and inlineform38 are constants , and inlineform39 and inlineform40 are constants , and inlineform41 and inlineform4"

4.6 allenai/led-large-16384

Pre-Train:
"SumSum.Summarize the following scientific article and create the abstract.Title: A cosmological solution to mimetic dark matter is a model that works not only on a galactic scale after adding higher derivative terms that alter the speed of sound and an auxiliary metric inlineform2 displayform0 is an interesting model that mimics cold dark matter even in the absence of normal matter .title: A Cosmological Solution to Mimetic Dark Matter\ufffd \u0bbf \u0bb4 \u0bbe \u0b9f \u0bb2 \u0bae \u0bb3 \u0ba9 \u0bcd \u0baa \u0bc1 \u0bb0 \u0bc0 \u0bb5 \u0ba3 \u0bc8 \u0b9a \u0bcb \u0ba4 \u0bc7 \u0ba8 \u0bca \u0b95 \u0bc6 \u0bb1 \u0bc2 \u0bb8 \u0bbd \u0baf \u0b9c \u0bcc \u0b89 \u0ba0 \u0ba1 \u0bbc \u0bad \u0b88 \u0bce \u0b99 \u0b82 \u0bdf \u0bcf \u0b9d \u0b9e \u0bc9 \u0bc4 \u0ba2 \u0b86 \u0bf0 \u0b80 \u0bf2 \u0bff \u0bda \u0b9b \u0b8e \u0bc3 \u0bab \u0bfe \u0bee \u0bc5 \u0ba5 \u0bba \u0bb7 \u0be3 \u0b8a \u0bfd \u0bf4 \u0bfc \u0be9 \u0b8f \u0bf1 \u0b8d \u0bea \u0b97 \u0bbb \u0bb6 \u0bac \u0bb9 \u0ba6 \u0bf8 \u0bd0 \u0b98 \u0b85 \u0bdd \u0be4 \u0b87 \u0bef \u0bf3 \u0bd5 \u0b8b \u0bd9 \u0bde \u0ba7 \u0b81 \u0bf7 \u0b4d \u0c30 \u0acd \u0c41 \u0c32 \u0b41 \u0c42 \u0c2f \u0c3f \u0c28 \u0b90 \u0c38 \u0c3e \u0c2a \u0ac0 \u0c4d \u0cb0 \u0b40 \u0c2e \u0ac8 \u0c15 \u0c47 \u0c02 \u0c4b \u0c1c \u0c1f \u0c0d \u0dbd \u0c1a \u0c46 \u0c21 \u0c48 \u0caf \u0cbf \u0ca8 \u0c40 \u0cae \u0c01 \u0cb8 \u0c4a \u0cb2 \u0cbe \u0c82 \u0c9f \u0ca0 \u0c23 \u0c29 \u0ca1 \u0c95 \u0a0d \u0cbe \u0c9a \u0cbd \u0c9c \u0cad \u0ca9 \u0cbe \u0caa \u0ca5 \u0ca3 \u0cb5 \u0ca6 \u0cb9 \u0cb6 \u0cac \u0cb7 \u0ca4 \u0cab \u0cb3 \u0ca7 \u0c99 \u0c98 \u0c85 \u0c97 \u0c9b \u0c8f \u0cb1 \u0c81 \u0db1 \u0c26 \u0c2d \u0cbe \u1caf \u0444 \u0445 \u0445 \u0446 \u0446 \u0446 \u0c88 \u0448 \u0445) \u0447 \u0445.introduction: a modification of general relativity was proposed in where a scalar field inlineform1 is defined by a vector of scalar fields inlineform3 , inlineform4 is a potential , and inlineform5 is the lagrangian of matter .by varying the action with respect to inlineform6 , inlinef7 , andinlineform8 , and taking the trace , equations (13) and (14) in # are obtained ,displayform0where inlineform9 is the energy - momentum tensor .note that the normalization condition on the four - velocity inlineform10 is the normalized condition (eqref3) .for a spatially flat frw universe with metric , displayform 0taking inlineform11 and calculating the time - time component of equation (3) , which is the same as the time component in the equation in the presence of ordinary matter (inlineform12) displayform1where , displayf0and inlineform13 is determined by given potential .note the fact that mimetic matter appears as an integration constant in the right hand side of (eq ref5) which gives a non - trivial solution even for inlineform14 .by multiplying equation (6) by inlineform15 and differentiating with respect of time , and substituting inlineform16 , display form0this equation allows to find cosmologically solutions for inlinef17 for any given potential \u00a0 \u00a0 \u00a0 \u00a0 \u00a0 \u00a0 \u00a0 \u00a0solution for exponential potential: plugging in the exponential potential , displayout0where in inlineform18 and inlinef19 are constants , we obtain displayform20by applying the transformation inlineform20 , differential equation (eqRef9) transforms to , displayForm0the solution to this differential"

Fine-Tuned:
"mimetic dark matter is a model that mimics cold dark matter even in the absence of ordinary matter .in this paper we propose a cosmological solution to this model by applying the transformation of the differential equation (eqref9) transforms to , displayform0the solution to which is obtained for

any given potential .we show that this solution is a non - trivial solution even for a spatially flat frw universe with metric , which is the friedmann equation in the presence of normal matter .we also show that the solution to the solution for exponential potential is obtained by plugging in the exponential potential ."

Chapter 5

Paper E: Geodesic equations in the static and rotating dilaton black holes: Analytical solutions and applications

This paper can be read for free on arXiv [9]. This is the corresponding targeted text:

"in this paper , we consider the timelike and null geodesics around the static [gmghs (gibbons , maeda , garfinkle , horowitz and strominger) , magnetically charged gmghs , electrically charged gmghs] andthe rotating (kerr - sen dilaton - axion) dilaton black holes .the geodesic equations are solved in terms of weierstrass elliptic functions .to classify the trajectories around the black holes , we use the analytical solution and effective potential techniques and then characterize the different types of the resulting orbits in terms of the conserved energy and angular momentum .also , using the obtained results we study astrophysical applications ."

Below are presented the outputs generated by the models.

5.1 facebook/bart-large-cnn

Pre-Train:
"Geodesic equations in the static and rotating dilaton black holes: Analytical solutions and applications. Study of motion of massive and massless particles give a set of comprehensive information about the gravitational field around a black hole. Analysis of geodesic equation of motion predict

some observational phenomena such as perihelion shift."

Fine-Tuned:
"the geodesic equations of motion in the static and rotating dilaton black holes were solved analytically in the spacetime of black hole in f(r)gravity using weierstrassian elliptic functions and their derivatives presented by hagihara in 1931 .the first analytic solution for schwarzschild spacetime was presented by reissner (1916) , weyl (1917) and nordstr \u00f6m (1918) , independentlyand now it is known as reisner - nord str \u00f6m metric .also , another solution of charged black hole was obtained by gibbons and maeda in four dimensions using a scalar field in range of low - energy of heterotic string theory , which is"

5.2 google/pegasus-large

Pre-Train:
"Abstract: Geodesic equations in the static and rotating dilaton black holes: Analytical solutions and applications Domains: Physics introduction: the well - known exact solution of the vacuum einstein equations described by schwarzschild in 1916 as a spherically symmetric black hole in a four dimensional spacetime .addition of an electric charge , change the schWARZSchild solution to a charged black hole .this solution was discovered by reissner (1916) , weyl (1917) and nordstrm (1918) by independentlyand now it is known as reissener - nordstm metric .also , another solution of charged Black hole in four dimensions was obtained by gibbons and maeda , independently , by garfinkle , horowitz and strominger using a scalar field in range of low - energy of heterotic string theory , which is called gmghs solution .the gmgh's black hole can be explained in string or einstein frame ,which are connected to each other by conformal transformation despite of differences of the physical properties in each frames .study of motion of massive and massless particles give a set of comprehensive information about the gravitational field around a black hole.analysis of geodesic equation of motion predict some observational phenomena such as perihelion shift , gravitational time - delay and light deflection .analytical solutions of geodesic equations were investigated for different spacetimes such as f(r)gravity ."

Fine-Tuned:
"Abstract: Geodesic equations in the static and rotating dilaton black holes: analytical solutions and applications Domains: Physics Introduction: the well - known exact solution of the vacuum einstein equations described by schwarzschild in 1916 as a spherically symmetric black hole in a four dimensional spacetime .addition of an electric charge , change the schwartzschild solution to a charged black hole .this solution was discovered by reissner (1916) , weyl (1917) and nordstrm (1918) independentlyand now it is known as reisse - nordstm metric .another solution of charged black holes in four dimensions was obtained by gibbons and"

5.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"recently , analytical solutions of geodesic equations were investigated for different spacetimes such as reissner - nordstrm , schwarzschild and gmghs black hole in four dimensions and in higher

dimensions.recently , geodesic equation of motion predict some observational phenomena such as shift , time - delay and light deflection.analysis of geodesics , which are described by the equations of motion of massive and massless particles give a set of comprehensive information about the gravitational field around a black hole.in this paper , we analytically solve the geodesic equations in the spacetime of a charged black hole which is described by gibbons and maeda , independently , by garfinkle , horowitz and strominger using a scalar field in range of low - energy of heterotic string theory ."

Fine-Tuned:
"in this paper , analytic solutions of geodesic equations were investigated in the spacetime of the generalized gmghs black hole , which is obtained by garfinkle , horowitz and strominger using a scalar field in range of low - energy of heterotic string theory in four dimensions.also , the null , timelike circular and nulltimelike geodesics were studied analytically.the properties of weierstrassian elliptic functions were demonstrated by jacobi , abel , riemann and baker , and the theoretical and mathematical properties of the solutions presented by the authors .in order to obtain the analytical solutions of the geodesic equations , we use the method of the weiertrass "

5.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

5.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"applied to the study of gravitational waves .\n\nmethodology: the first step is to find the geodesics of a static black hole , which can be expressed by the geodetic equation .this equation can be written in the form , where is the metric tensor of the black hole , is a constant of integration and is an arbitrary function of time .solving this equation for , we get , and , respectively .these two equations can be integrated to get and .then , we can get by substituting into .similarly , can be obtained by integrating .using the initial condition , the solution can be found by solving for .in the case of static black holes, the solution is analytical and can be presented in terms of elliptic integrals of the first and second kind .if the black holes are rotating, then the solutions are not analytical but can be approximated by numerical methods .numerical methods can be used to approximate the solutions for different values of the mass and the angular momentum .for example, the numerical solution for a rotating Schwarzshild black hole with a mass of 1.4 times the mass of the sun and an angular

momentum of 0.001 was obtained using the finite difference method .another numerical method is to use the symplectic integrator .symplectic methods are based on the principle of conservation of angular momentum and are widely used in celestial mechanics and astrophysics .finally , the solutions can be compared with the analytical solutions to check the accuracy of the numerical methods and the validity of the approximations .applications: the solutions obtained in this article can be applied to a wide range of astrophysical and cosmological problems such as black hole formation and evolution, gravitational lensing, cosmic strings, and cosmic inflation .black hole formation is one of the most important processes in the evolution of the universe .it is believed that the formation of black holes is a result of the collapse of a massive object , such as a neutron star or a black dwarf , into a singularity .when a massive body collapses, it creates a region of intense gravitational force .as the density of the matter in this region increases, the pressure of the gas becomes so high that it causes the gas to collapse further .once the gas has collapsed to a point, it can no longer expand and form a star , but it can continue to collapse until it reaches a point of no return , at which point it becomes a blackhole .gravity plays a crucial role in this process .cosmic strings are another important phenomenon that can occur in the early universe , when the universe was very hot and dense .they are formed when the energy density of matter exceeds the critical density , leading to the creation of topological defects in the space-time .gravitational waves can also be produced by the formation and collapse of blackholes , as well as by the merger of blackhole binaries .cosmic strings can also play a role in galaxy formation , by creating filaments of dark matter and dark energy .inflation is another important process in the universe's history , during which the universe underwent a brief period of exponential expansion .during inflation, the density fluctuations of the cosmic microwave background radiation (cMBR) were amplified by the exponential growth of the scalar field , causing the universe to undergo a period of accelerated expansion , known as the inflationary epoch .geodesic motion is a fundamental concept in general relativity , allowing us to study the behavior of matter and energy in curved spacetime .by analyzing geodesies, we can learn about the properties of spacetime, such as its curvature and topology .we can also use geodesy to study gravitational fields and the dynamics of massive bodies .conclusion: the geophysical and astronomical applications of the solutions presented in this paper are vast and diverse, ranging from blackhole formation to cosmicstring formation, galaxyformation, and inflation.these solutions can provide valuable insights into the nature of gravity and the universe, and can help us better understand the fundamental laws of physics ."

Fine-Tuned:

"investigated for the static and rotating dilaton black holes in four and five dimensions .the static and rotating dilaton black holes in four dimensions were studied in .the static and rotating dilaton black holes in five dimensions were studied in .the static and rotating dilaton black holes in six dimensions were studied in .the static and rotating dilaton black holes in seven dimensions were studied in .the static and rotating dilaton black holes in eight dimensions were studied in .the static and rotating dilaton black holes in nine dimensions were studied in .the static and rotating dilaton black holes in ten dimensions were studied in .the static and rotating dilaton black holes in eleven dimensions were"

5.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: Geodesic equations in the static and analytical solutions and applications of geodesic equation of black holes in the spacetime of a black hole can be explained in a string or einstein frame , which are connected to each other by conformal transformation despite of differences of the physical properties in each frames .introduction: the well - known exact solution of the vacuum einstein equations described by schwarzschild in 1916 as a spherically symmetric black hole in a four dimensional spacetime .addition of an electric charge , change the schrowzschild solution to a charged black hole .this solution was discovered by reissner (1916) , weyl (1917) and nordstr\u00f6m (1918) , independentlyand now it is known as reissners - nordstra\u00f6m black hole solution in four dimensions and in higherdimensions .the gmghs black hole was obtained by gibbons and maeda , independently , by garfinkle , horowitz and strominger using a scalar field in range of high - energy and low - energy of heterotic string theory , which is called gmhts solution the ggghs spacetime and the black hole which is combined by cosmic string was studied extensively and in the spacetimes such as f(r)gravity and f(n)gravitygravity.study of motion of massive and massless particles give a set of comprehensive information about the gravitational field around a black Hole .analysis of geode of motion predict some observational phenomena such as perihelion shift , gravitational time - delay and light deflection .the first analytic solution for schwarZschild spacetime using weierstrassian elliptic functions and their derivatives presented by hagihara in 1931 ..the theoretical and mathematical properties of weierstriassian elliptick functions demonstrated by jacobi ; abel : riemann weierstraass .Summarized the following academic article and created the abstractTitle:Geodesic problems in the dynamic and rotating dilaton black holes: Analytical solutions and ApplicationsDomains: Physics and Astronomy"

Fine-Tuned:
"geodesic equations of motion predict some observational phenomena such as perihelion shift , gravitational time - delay and light deflection .analytical solutions of geodesic equation of motion were investigated for different spacetimes such as reissner - nordstr \u00f6m , schwarzschild-anti)de sitter and reissnier - norde sitter spactime in four dimensions and in higherdimensions .the motion of test particles around rotating black holes in f(r)gravity was studied extensively in the spacetime of a black hole which is combined by cosmic string .recently , geodesics equations were solved analytically in the static and rotating dilaton black holes .the geodes"

Chapter 6

Paper F:
On the Performance of ConvNet Features for Place Recognition

This paper can be read for free on arXiv [10]. This is the corresponding targeted text:

"after the incredible success of deep learning in the computer vision domain , there has been much interest in applying convolutional network (convnet) features in robotic fields such as visual navigation and slam .unfortunately , there are fundamental differences and challenges involved .computer vision datasets are very different in character to robotic camera data , real - time performance is essential , and performance priorities can be different .this paper comprehensively evaluates and compares the utility of three state - of - the - art convnets on the problems of particular relevance to navigation for robots ; viewpoint - invariance and condition - invariance , and for the first time enables real - time place recognition performance using convnets with large maps by integrating a variety of existing (locality - sensitive hashing) and novel (semantic search space partitioning) optimization techniques .we present extensive experiments on four real world datasets cultivated to evaluate each of the specific challenges in place recognition .the results demonstrate that speed - ups of two orders of magnitude can be achieved with minimal accuracy degradation , enabling real - time performance .we confirm that networks trained for semantic place categorization also perform better at (specific) place recognition when faced with severe appearance changes and provide a reference for which networks and layers are optimal for different aspects of the place recognition problem ."

Below are presented the outputs generated by the models.

6.1 facebook/bart-large-cnn

Pre-Train:
"convnets have been demonstrated to be versatile and transferable. We exploit the hierarchical nature of convnet features and use the semantic information encoded in the higher layers for search space partitioning and the mid - level features for place matching under challenging conditions. Locality - sensitive hashing of these features allows us to perform robust place recognition against 100,000 known places with 3 hz."

Fine-Tuned:
"convolutional networks (convnets) have been shown to outperform other methods in a broad variety of visual recognition , classification and detection tasks .convnets have been demonstrated to be versatile and transferable , i.e. even although they were trained on a very specific target task , they can be successfully deployed for solving different problems and often even outperform traditional hand engineered features .our paper leverages these astounding properties and introduces the first real - time capable convnet - based place recognition system .we exploit the hierarchical nature of convnet features and use the semantic information encoded in the higher layers for search space partitioning and the mid - level features for place matching under challenging conditions .locality - sensitive hashing of these features allows us"

6.2 google/pegasus-large

Pre-Train:
"place recognition: the focus of research in place recognition has recently moved from recognizing scenes without significant appearance changes to more demanding , but also more realistic changing environments .methods that address the place recognition problem span from matching sequences of images transforming images to become invariant against common scene changes such as shadows learning how environments change over time and predicting these changes in image space particle filter - based approaches that build up place recognition hypotheses over"

Fine-Tuned:
"even although they were trained on a very specific target task , they can be successfully deployed for solving different problems and often even outperform traditional hand engineered features .convnets have been demonstrated to be versatile and transferable , i.e."

6.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"this paper introduces the first real - time , robust and low - cost system for place recognition based on convolutional networks (convnets) .<n> we address the problem of recognizing 100,000 known places with 3 weeks of data using state - of - the - art high - layer conv nets , mid - level layers and transferable higher - layer features for place matching under severe appearance changes and viewpoint variations . <n> we analyze the performance of the individual conv nets for the task of place recognition and introduce important algorithmic performance improvements ."

Fine-Tuned:
"in this paper we present the first real - time convnet - based system for the task of place recognition under severe appearance and viewpoint variations .we exploit the astounding properties of the features generated by convolutional networks to perform robust place recognition against 100,000 known places with 3 weeks of training data and compare three state - the - art networks for this task.we analyze the performance of the individual layers in the conv net features on several challenging datasets and introduce important algorithmic performance improvements .our results show that the layers generated by the higher layers of the convolutional network are of high utility for place recognition and that the mid - level layers are of crucial importance for robust place matching under challenging conditions.we provide a thorough investigation of the utility of the"

6.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

6.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"of known places to matching images of unknown places .in this paper, we focus on the latter problem .place recognition is a fundamental problem in robotics and autonomous vehicles , where the robot must be able to recognize and navigate to known places in an environment that can change dramatically over time .the current state of the art in this field relies heavily on hand - engineered feature sets that are trained on specific tasks and environments .these feature sets often fail to generalize well to new environments and are not transferable to other tasks .in recent years, convolutional neural networks (cnn) have emerged as a promising approach to address these challenges .CNNs have shown impressive performance in a wide variety of computer vision tasks, including object detection , image classification , and semantic segmentation .In particular, cnn-based methods have shown remarkable success in place detection and recognition .However, the use of cnn for place detection is still limited by the lack of a robust feature set that can handle the challenging appearance changes that occur in real-world environments .To overcome this limitation, we propose a novel approach to place recognition that exploits the properties of convolutional nets .Our approach is based on the idea of hierarchically partitioning the feature space and using locality-sensitive hashing (lsah) to partition the space in a way that maximizes the similarity between known and unknown places .We then use this partitioned feature space to perform place recognition in a real-time and robust manner .We demonstrate the effectiveness of our approach

by comparing it to state-of-the-art methods on a challenging dataset of known and unseen places .\nsection secref2 provides an overview of the recent progress in convnet-based place recognition and highlights the main contributions of this paper .section secrefs3 and 4 describe the datasets used in this paper and the evaluation protocol .Section secrefs5 presents the results of our experiments and compares our approach to the state- of- the- art methods on several datasets.Section secref6 discusses the limitations of the approach and provides an analysis of the algorithmic improvements that we have introduced.Finally, section secrefs7 and 8 conclude the paper and provide a brief summary of the main findings and implications for future research.\nconclusion: place recognition is an essential task for autonomous robots and vehicles that operate in dynamic and changing environments.Recent advances in computer vision have led to the development of powerful and versatile feature sets for this task, but these feature sets are often limited in their ability to handle appearance changes in real - world environments.In this paper we introduce a novel convnet approach that overcomes this limitation by exploiting the properties and structure of the convolutional layers.We demonstrate that our approach outperforms traditional hand-engineered features and is capable of robustly recognizing and navigating to unknown places in challenging environments.Our results demonstrate the potential of this approach for a wide range of robotic and automotive applications that require place recognition.However,further research is needed to fully exploit this approach and to address its limitations in terms of scalability, robustness, and generalizability."

Fine-Tuned:
"of the same place , to matching sequences of images of different places , to matching sequences of images of the same place with different viewpoints , to matching sequences of images of different places with the same viewpoint , to matching sequences of images of the same place with different viewpoints , to matching sequences of images of different places with the same viewpoint , to matching sequences of images of the same place with different viewpoints , to matching sequences of images of different places with the same viewpoint , to matching sequences of images of the same place with different viewpoints , to matching sequences of images of different places with the same viewpoint , to matching sequences of images of the same place with different viewpoints , to matching sequences of images of different places with the"

6.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: On the first real - time capable convnet - based place recognition system for place recognition with 3 hz .title:Title:On the Performance of ConvNet Features for Place Recognition with 3hz .Title:Place recognition with 1 hz.Summarized the following academic article and summarize the abstract and summarize it.title: OnThe Performance of convnet features for Place recognition .introduction: robots that aim at autonomous long - term operations over extended periods of time , such as days , weeks , or months , are faced with environments that can undergo dramatic changes in their visual appearance over time .visual place recognition \u2013 the ability to recognize a known place in the environment using vision as the main sensor modality \u2013 is largely affected by these appearance changes and is therefore an active research field within the robotics community .the recent literature proposes a variety of approaches to address the challenges of this field .recent progress in the computer

vision and machine learning community has shown that the features generated by convolutional networks (convnets , see fig .figref2for examples) outperform other methods in a broad variety of visual recognition , classification and detection tasks convnets have been demonstrated to be versatile and transferable , i.e. even although they were trained on a very specific target task , they can be successfully deployed for solving different problems and often even outperform traditional hand - engineered feature architectures .we use convnets to exploit these transferable properties and introduces the world's first convnet based place - recognition system .we exploit the hierarchical nature of conv network features and use the semantic information encoded in the higher layers for search space partitioning and the mid - level features for place matching under challenging conditions .locality - sensitive hashing of these features allows us to perform robust place recognition against 100,000 known places with 3Hz .we provide a thorough investigation of the utility of the individual layers in the convnet hierarchy under severe appearance and viewpoint variations and furthermore compare three state - of - the - art networks for the task of place recognition .we establish the following main results :in the following we review the related literature before describing the datasets and evaluation protocol used .we analyze the performance of individual convnet feature layers in section secref4 and introduce important algorithmic performance improvements in sectionsecref5 before concluding the paper .place recognition: the focus of research in place recognition has recently moved from recognizing scenes without significant appearance changes to more demanding , but also more realistic changing environments .methods that address the place recognition problem span from matching sequences of images transforming images to become invariant against common scene changes such as shadows learning how environments change over time and predicting these changes in image space particle filter"

Fine-Tuned:
"convolutional networks (convnets) have been shown to outperform other methods in a broad variety of visual recognition , classification and detection tasks .convnets have been demonstrated to be versatile and transferable , i.e. even although they were trained on a very specific target task , they can be successfully deployed for solving different problems and often even outperform traditional hand engineered features .our paper leverages these astounding properties and introduces the first real - time capable convnet - based place recognition system .we exploit the hierarchical nature of convnet features and use the semantic information encoded in the higher layers for search space partitioning and the mid - level features for place matching under challenging conditions .locality - sensitive hashing of these features allows us"

Chapter 7

Paper G: Evolutionary Trigger Set Generation for DNN Black-Box Watermarking

This paper can be read for free on arXiv [2]. This is the corresponding targeted text:

"the commercialization of deep learning creates a compelling need for intellectual property (ip) protection .deep neural network (dnn) watermarking has been proposed as a promising tool to help model owners prove ownership and fight piracy .a popular approach of watermarking is to train a dnn to recognize images with certain
textbfPre-Train:
trigger patterns .in this paper , we propose a novel evolutionary algorithm - based method to generate and optimize trigger patterns .our method brings a siginificant reduction in false positive rates , leading to compelling proof of ownership .at the same time , it maintains the robustness of the watermark against attacks .we compare our method with the prior art and demonstrate its effectiveness on popular models and datasets ."

Below are presented the outputs generated by the models.

7.1 facebook/bart-large-cnn

Pre-Train:
"deep neural networks have become the de facto solution to many complex computer vision , speech recognition , and natural language processing problems. While the dnns are fueling commercial successes in the ai market , a void in ip protection for dnn models may hinder the progress. This

paper proposes a solution to the ip protection problem in deep learning."

Fine-Tuned:
"deep neural networks (dnns) have become the de facto solution to many complex computer vision , speech recognition , and natural language processing problems .recently , several researchers proposed watermarking as a viable solution to the ip protection problem in deep learning .the concept has been extended to cover software , embedded systems , and circuits , as well as to deep neural networks .the watermark is embedded in the input - output behavior of the model .the set of input used to trigger that behavior is called trigger set .for the popular task of image classification , a common approach is to assign a random label to trigger images and train the model to classify accordingly .the non - triviality of ownership of a watermarked model is a"

7.2 google/pegasus-large

Pre-Train:
"Title: Evolutionary Trigger Set Generation for DNN Black-Box Watermarking Domains: Mathematics introduction: since the success of large scale neural networks in the early 2010s , we have witnessed an explosive growth in the field .the popularity grew not only in academia but in the industry as well .deep neural networks (dnns) have become the de facto solution to many complex computer vision , speech recognition , and natural language processing problems .popular as deep learning may be , building ddns to solve real - world problemsremains an arduous task .it requires a vast amount of high - quality labeled data and heavy use of computational resources and human expertise . it goes without saying that Dnns are invaluable technological assets that potentially has huge commercial impacts .over the past few years , myriads of companies have joined the ai arms race .just among ai startups , investment from the venture capital market reached a record high $ 9.3 billion in 2018 .among the companies , many provide range from commercial libraries for embedded systems , cloud machine learning apis to building private corporate clouds for ai , spanning across industries like transportation , manufacturing , healthcare , finance ,, and consumer electronics .while the dnn's are fueling commercial successes in the thei market , a void in ip protection for dnn models may hinder the progress .when a model owner sells a service to a customer , she should have a reliable way to prevent the customer from illegally distributing or reselling it .to achieve that goal , the owner not only needs to identify her own model when it is distributed , but also prove the ownership to a trusted arbitrator ."

Fine-Tuned:
"deep neural networks (dnns) have become the de facto solution to many complex computer vision , speech recognition , and natural language processing problems .popular as deep learning may be , building ddns to solve real - world problemsremains an arduous task .it requires a vast amount of high - quality labeled data and heavy use of computational resources and human expertise .today , myriads of companies have joined the ai arms race .investment from the venture capital market reached a record high $ 9.3 billion in 2018 .among the companies , many provide range from commercial libraries for embedded systems , cloud machine learning apis to building private corporate clouds for ai , spanning across industries like"

7.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"in this paper , we study the problem of ip protection for deep networks (dnns) .<n> we propose a novel ip protection mechanism based on a deep network (dn) extension of the random cover model (r.n.m .) to solve the ip protection problem originally proposed by white and his collaborators.in the proposed method , a dnn is trained by randomly assigning weights to its outputs.the method is evaluated on two benchmark ip protection tasks : 1) @xmath0-based classification and 2) multimedia content watermarking.in both cases , our method is proven to be effective , efficient , and scalable.in addition , the method has been applied to several ip protection problems in the industry ."

Fine-Tuned:
"in this paper , we study the problem of ip protection for deep neural networks (dnns) .in the field of dnn ip protection , there are two key issues : (1) the ip is distributed , and (2) there is no guarantee that the dnn model belongs to a trusted box .to address these two issues , the authors propose a novel method to train dnn models with a distributed ip .the method is based on a stochastic gradient (sg) algorithm , which is a generalization of the gaussian ensemble (gse) method.the proposed method is able to achieve a near - optimal rate of success (rs)"

7.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

7.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"of black-box watermarks for a given dnn can be generated by a black - box algorithm .in this article , we propose a new watermaking algorithm for dnss that generates watermasks in a black- box manner .the algorithm is based on a combination of a genetic algorithm (ga) and an evolutionary algorithm (ea) .the ea is used to evolve a set of genotypes , each of which represents a possible set of dnn weights .The genotype with the highest fitness function value is selected as the final output of the algorithm .the genetic operators used in the ea include crossover , mutation , and recombination .we evaluate the performance of the proposed algorithm on a dataset of 1000 images from the cifar-10 dataset .the results show that the algorithm can generate high-quality watermaps

that are indistinguishable from the original dnn model .overall , our proposed algorithm can be seen as a complementary approach to white - box and black box methods for ip protection in dnn-based systems .it can be used in conjunction with these methods to provide a more comprehensive approach to ip protection ."

Fine-Tuned:
"of black - box watermarks for a dnn is called the watermarking set .the watermarking set of a dnn is a set of watermarks that can be embedded in the model 's output .the watermarking set of a dnn is a set of watermarks that can be embedded in the model 's output .the watermarking set of a dnn is a set of watermarks that can be embedded in the model 's output .the watermarking set of a dnn is a set of watermarks that can be embedded in the model 's output .the watermarking set of a dnn is a set of watermarks that"

7.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: Evolutionary Trigger Set Generation for DNN Black-Box Watermarking is a viable solution to the ip protection problem in deep learning for ai , a void in ip protection for dnn models may hinder the progress .it goes without saying that the dnns are invaluable technological assets that potentially has huge commercial impacts .the popularity grew not only in academia but in the industry as well .deep neural networks (ddns) have become the de facto solution to many complex computer vision , speech recognition , and natural language processing problems .popular as deep learning may be , building ddns to solve real - world problemsremains an arduous task .it requires a vast amount of high - quality labeled data and heavy use of computational resources and human expertise .over the past few years , myriads of companies have joined the ai arms race .just among ai startups , investment from the venture capital market reached a record high $ 9.3 billion in 2018 .among the companies , many provide range from commercial libraries for embedded systems , cloud machine learning apis to building private corporate clouds for a i , spanning across industries like transportation , manufacturing , healthcare , finance , and consumer electronics .while the ddns are fueling commercial successes in the deep learning i .digital watermarking originally refers to the process of covertly embedding information in multimedia content .the concept has since been extended to cover software , circuits as well as dnn .white - box watermarkings embeds the owner 's information in the weights of a dnn .black - box wm - watermarkers embed the watermark in the input - output behavior of the model .the set of input used to trigger that behavior is called trigger set .for the popular task of image classification , a common approach is to assign a random label to trigger images and train the model to classify accordingly .the non"

Fine-Tuned:
"deep neural networks (dnns) have become the de facto solution to many complex computer vision , speech recognition , and natural language processing problems .despite their widespread popularity , building ddns to solve real - world problems remains an arduous task .it requires a vast amount of high - quality labeled data and heavy use of computational resources and human expertise .recently , several researchers proposed watermarking as a viable solution to the ip protection problem in deep learning .in this paper , we propose an evolutionary trigger set generation algorithm for deep

neural networks that embeds the watermark in the input - output behavior of the model .the set of input used to trigger that behavior is called trigger set .for the popular task of image classification ,"

Chapter 8

Paper H: $f(T)$ modified teleparallel gravity as an alternative for holographic and new agegraphic dark energy models

This paper can be read for free on arXiv [3]. This is the corresponding targeted text:

"in the present work , we reconstruct different f(t)-gravity models corresponding to the original and entropy - corrected version of the holographic and new agegraphic dark energy models .we also obtain the equation of state parameters of the corresponding f(t)-gravity models .we conclude that the holographic and new agegraphic f(t)-gravity models behave like phantom or quintessence model .whereas in the entropy - corrected models , the equation of state parameter can justify the transition from the quintessence state to the phantom regime as indicated by the recent observations ."

Below are presented the outputs generated by the models.

8.1 facebook/bart-large-cnn

Pre-Train:
"F(T) modified teleparallel gravity models as an alternative for holographic and new agegraphic dark energy models. The hde model is motivated from the holographic principle. The de model takes up about two - thirds of the total energy density from cosmic observations. The energy density of the hde can be derived from the entropy bound."

Fine-Tuned:
"recent observational data from type ia supernovae surveys , large scale structure (lss) surveys , and the cosmic microwave background (cmb) anisotropy spectrum points toward the picture of a spatially flat universe undergoing an accelerated expansion driven by a dominant negative pressure fluid , typically referred to as dark energy (de) .it is shown that de takes up about two - thirds of the total energy density from cosmic observations .although the nature and cosmological origin of de is still enigmatic at the present , a great variety of models have been proposed to describe the de .two promising candidates are the holographic de (hde) model and the agegraphic de model .the hde model is motivated from the"

8.2 google/pegasus-large

Pre-Train:
"Title: f(T) modified teleparallel gravity models as an alternative for holographic and new agegraphic dark energy models Domains: Physics introduction: recent observational data coming from type ia supernovae (sneia) surveys , large scale structure (lss) , and the cosmic microwave background (cmb) anisotropy spectrum points toward the picture of a spatially flat universe undergoing an accelerated expansion driven by a dominant negative pressure fluid .it is shown that de takes up about two - thirds of the total energy density from cosmic observations .although the nature and cosmological origin of de is still enigmatic at the present , a great variety of models have been proposed to describe the de (for reviewsee ,)"

Fine-Tuned:
"f(T) modified teleparallel gravity models as an alternative for holographic and new agegraphic dark energy models Domains: Physics introduction: recent observational data coming from type ia supernovae (sneia) surveys , large scale structure (lss) , and the cosmic microwave background (cmb) anisotropy spectrum points toward the picture of a spatially flat universe undergoing an accelerated expansion driven by a dominant negative pressure fluid , typically referred to as dark energy (de).it is shown that de takes up about two - thirds of the total energy density from cosmic observations .although the nature and cosmological origin of de is still enigmatic at the present , a great variety of models have been"

8.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"modified teleparallel gravity (mtg) models have been proposed as an alternative to dark energy models . in this work ,<n> we show that the modified tele parallel gravity models can be used to describe the holographic dark energy (hde) model and the agegraphic dark energy model ."

Fine-Tuned:
"the modified teleparallel gravity (mtg) model is an alternative to the holographic dark energy (hde) and the agegraphic dark energy models .in this model , we show that the modified mtgs model can give rise to an accelerated expansion of the universe , and the cosmic coincidence problem can be solved .it is shown that the model can also provide a solution to the cosmic inflation problem ."

8.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

8.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"the parameters of hde and ade models , show that these models are in good agreement with the observed cosmic data .in this paper , we propose a new class of de models based on the f (T) modification of the teleparallel equivalent of general relativity (tegra) .these models are motivated by the idea that de can be described by a non - minimally coupled scalar field (sscf) , which interacts only through the f - term in the lagrangian .the f term is a function of the torsion tensor , which is defined as the covariant derivative of the metric tensor with respect to the tetrad field .the torsional degrees of freedom of the scalar field are generated by the f term , which can be interpreted as a new form of dark energy .we show that this model can explain the observed de without invoking any new physics beyond the standard model of particle physics (smp) .in particular , it can accommodate the observed value of the cosmological constant without introducing any fine - tuning .we also discuss the implications of this model for the nature of dark matter and dark energy.conclusion: the proposed model is a promising alternative to the standard models of de and ade .it provides a natural explanation for the observed values of de , ade , and cosmic acceleration .furthermore , it does not require any fine-tuning of the model parameters .the model can be tested by future cosmological observations ."

Fine-Tuned:
"the parameters of the hde model , suggest that inlineform16 and inlineform17 are in the range inlineform18 and inlineform19 , respectively .the agegraphic de model is motivated from the agegraphic principle .the agegraphic de density is given by displayform0where inlineform20 is the agegraphic cosmological constant , inlineform21 is the agegraphic dark energy density , inlineform22 is the agegraphic matter density , inlineform23 is the agegraphic energy density , inlineform24 is the agegraphic pressure , and inlineform25 is the agegraphic entropy density .the"

8.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: f(T) modified telepar-

allel gravity models as an alternative for holographic and new agegraphic dark energy models for the non - flat universe and for the flat case inlineform (hde) models are originated from some considerations of the features of the quantum theory of gravity .the hde model is motivated from the holographic principle .following guberina et al . , the hde density can be derived from the entropy bound .in the thermodynamics of the black hole , there is a maximum entropy in a box of size inlineform0 , namely , the bekenstein - hawking entropy bound inlineform1 , which scales as the area of the box inlineform2 , rather than the volume inlineform3 .here inlineform4 is the reduced planck mass inlineform5 .also for a macroscopic system in which self - gravitation effects can be disregarded , the Bekenstein-Hawking energy density inlineform6 is given by the product of the energy inlineform7 and the length scale (ir cut - off) inlineform8 of the system .hereinlineform9 is the quantum zero point energy density caused by the uv cut -off inlineform10 .requiring inlineform11 , namely inlineform12 , one has inlineform13 .if the largest cut - order inlineform14 is taken for saturating this inequality , we get the energy density of the hre as displayform0where inlineform15 is a numerical constant .recent observational data , which have been used to constrain the h de model , show that for the spatially flat universe inlineform16 , and for some other cases inlineform17 introduction: recent observational data coming from type ia supernovae (sneia) surveys , large scale structure (lss) , and the cosmic microwave background (cmb) anisotropy spectrum points toward the picture of a spatually flat universe undergoing an accelerated expansion driven by a dominant negative pressure fluid , typically referred to as dark energy (de) .it is shown that de takes up about two - thirds of the total energy density from cosmic observations .although the nature and cosmological origin of de is still enigmatic at the present , a great variety of models have been proposed to describe the de (for review see) .two promising candidates are the holography of the dark energy model (hd) and the oldgraphic de (ade)) models which are motivated from some of the characteristics of the classical gravity model.summarize.Summarized the following abstract."

Fine-Tuned:
"the holographic de (hde) model is motivated from the holographic principle .recent observational data , which have been used to constrain the hde model , show that for the non - flat universe , the de takes up about two - thirds of the total energy density from cosmic observations .although the nature and cosmological origin of de is still enigmatic at the present , a great variety of models have been proposed to describe the de (for reviewsee f(T) modified teleparallel gravity models as an alternative for holographic and new agegraphic dark energy models .in this paper , we show that f(t) modified f(t) modified gravity models can be used to derive the energy density of the holog"

Chapter 9

Paper I: Piecewise convexity of artificial neural networks

This paper can be read for free on arXiv [6]. This is the corresponding targeted text:

"although artificial neural networks have shown great promise in applications including computer vision and speech recognition , there remains considerable practical and theoretical difficulty in optimizing their parameters .the seemingly unreasonable success of gradient descent methods in minimizing these non - convex functions remains poorly understood .in this work we offer some theoretical guarantees for networks with piecewise affine activation functions , which have in recent years become the norm .we prove three main results .firstly , that the network is piecewise convex as a function of the input data .secondly , that the network , considered as a function of the parameters in a single layer , all others held constant , is again piecewise convex .finally , that the network as a function of all its parameters is piecewise multi - convex , a generalization of biconvexity .from here we characterize the local minima and stationary points of the training objective , showing that they minimize certain subsets of the parameter space .we then analyze the performance of two optimization algorithms on multi - convex problems : gradient descent , and a method which repeatedly solves a number of convex sub - problems .we prove necessary convergence conditions for the first algorithm and both necessary and sufficient conditions for the second , after introducing regularization to the objective .finally , we remark on the remaining difficulty of the global optimization problem .under the squared error objective , we show that by varying the training data , a single rectifier neuron admits local minima arbitrarily far apart , both in objective value and parameter space ."

Below are presented the outputs generated by the models.

9.1 facebook/bart-large-cnn

Pre-Train:
"Artificial neural networks are currently considered the state of the art in applications ranging from image classification to speech recognition. Little is understood about the process by which they are trained for supervised learning tasks. This article attempts a modest step towards understanding the dynamics of the training procedure. We establish three main convexity results for a class of neural network."

Fine-Tuned:
"we establish three main convexity results for a certain class of neural network , which is the current state of the art .first , that the objective function of a neural network is piecewise convex as a function of the input data , with parameters fixed , which corresponds to the behavior at test time .second , that its objective function is convex if the parameters of a single layer are piecewise affine functions , and that it can be represented by a finite number of convex functions , each active on a multi - convex parameter set .that is , the training objective function , for which all parameters are variable but the inputdata is fixed , is also convex .third , that for which the parameters are fixed"

9.2 google/pegasus-large

Pre-Train:
"Title: Piecewise convexity of artificial neural networks Domains: Mathematics introduction:artificial neural networks are currently considered the state of the art in applications ranging from image classification , to speech recognition and even machine translation .however , little is understood about the process by which they are trained for supervised learning tasks .the problem of optimizing their parameters is an active area both practical and theoretical research .despite considerable sensitivity to initialization and choice of hyperparameters , neural networks often achieve compelling results after optimization by gradient descent methods .due to the nonconvexity and massive parameter space of these functions , it is poorly understood how these sub - optimal methods have proven so successful .indeed ."

Fine-Tuned:
"we prove three main convexity results for a certain class of neural network , which is the current state of the art in applications ranging from image classification , to speech recognition and even machine translation .this article attempts a modest step towards understanding the dynamics of the training procedure .we provide a theoretical framework for the optimization of neural networks ."

9.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"this article establishes three main convexity results for a certain class of neural network , which is the current state of the art .<n> first , that the objective is piecewise convex as a function of the input data , with parameters fixed.that corresponds to the behavior at test time . second , and as a consequence of a generalization of biconvexity to piecewise functions and arbitrary index sets , we

show that the training objective function , for which all parameters are variable but the inputs are fixed , is piece wise multi - convex ."

Fine-Tuned:
"we prove three convexity results for a certain class of neural network , which is the current state of the art.first , that the objective is piecewise convex as a function of the input data , with parameters fixed.that corresponds to the behavior at test time .second , the objective again has a piecewise multi - convex shape , for which all parameters are variable but all other parameters are fixed .that is , it is a continuous function which can be represented by a finite set of multi -convex functions .this generalizes the notion of biconvexity found in the optimization literature to piecewise functions and arbitrary index sets .to prove these results , we require two main restrictions on the definition"

9.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

9.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"on the structure of the objective function or the choice of activation function , but do require that it be convex and differentiable .in summary , this article establishes three main results on the behavior of neural networks during training .the first result shows that their objective function can be expressed as a sum of convex and non convex terms .the second result establishes a connection between the training behavior and the behavior on test data .the third result generalizes previous results in the literature and provides a general framework for understanding the training dynamics of deep neural networks .\n\nkeywords: neural networks, optimization, training, convexity, piecewise, multi-convex, least squares, logistic, convolutional, max-pooling\n\nmethods: convex analysis, optimization theory, neural network theory, deep learning\n\nresults: convexity properties, training behavior, connection to test data, general frameworktextbackslash \n\ndiscussion: implications for practical applications and future research directions\n\nconclusion: this article provides new insights into the training process of deep learning neural networks by establishing three key results on their behavior during training. These results are based on convexity and continuity properties of the loss function and the network parameters, and can be applied to a wide range of use cases, including classification, regression, and generative models. Future research directions include the development of new training algorithms based on these results, as well as the extension

of these results to more complex neural networks with multiple layers and nonlinear activation functions. Overall, this article contributes to a growing body of research on the optimization and training of deep networks, and provides new tools and insights for practitioners and researchers working in this field."

Fine-Tuned:
"on the choice of activation functions , but we do require that they are piecewise affine .we also require that the objective function is convex and continuously differentiable , and that it can be represented by a finite number of multi - convex functions , each active on a multi - convex parameter set .this generalizes the notion of biconvexity found in the optimization literature to piecewise functions and arbitrary index sets .our definition includes many contemporary use cases , such as least squares or logistic regression on a convolutional neural network with rectified linear unit (relu) activation functions and either max- or mean - pooling .in recent years these networks have mostly supplanted the classic sigmoid type , except in the case of"

9.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: Piecewise convexity of artificial neural networks is a modest step towards understanding the dynamics of the training procedure for a certain class of neural networks , which is the current the state of the art .we establish three main convexities for a neural network , which we make no assumptions .our definition includes many contemporary use cases , such as least squares or logistic regression on a convolutional neural network with rectified linear unit (relu) activation functions and either max - or mean - pooling .in recent years these networks have mostly supplanted the classic sigmoid type , except in the case of recurrent networks .we make no further assumptions"

Fine-Tuned:
"we establish three main convexity results for a certain class of artificial neural network , which is the current state of the art .first , that the objective is piecewise convex as a function of the input data , with parameters fixed , which corresponds to the behavior at test time .second , that this objective function is convex and continuously differentiable .that is , it is a continuous function which can be represented by a finite number of multi - convex functions .this generalizes the notion of biconvexity found in the optimization literature to piecewise functions and arbitrary index sets ."

Chapter 10

Paper J: Introspection Learning

This paper can be read for free on arXiv [8]. This is the corresponding targeted text:

"traditional reinforcement learning agents learn from experience , past or present , gained through interaction with their environment .our approach synthesizes experience , without requiring an agent to interact with their environment , by asking the policydirectlyäre there situationsx , y , and z , such that in these situations you would select actions a , b , and c?ïn this paper we present introspection learning , an algorithm that allows for the asking of these types of questions of neural network policies .introspection learning is reinforcement learning algorithm agnostic and the states returned may be used as an indicator of the health of the policy or to shape the policy in a myriad of ways .we demonstrate the usefulness of this algorithm both in the context of speeding up training and improving robustness with respect to safety constraints .",

Below are presented the outputs generated by the models.

10.1 facebook/bart-large-cnn

Pre-Train:
"In this paper, we describe a novel approach to answering and utilizing the answers to questions of this form when asked not of a human agent , but of a reinforcement learning agent. Our approach is not based solely on the deployment of techniques from the typical machine learning toolbox , as we make crucial use of smt - solving. We use an oracle that may give us direct access to sets of (state , action) pairs satisfying fixed constraints with respect to the policy network."

Fine-Tuned:
"in this paper , we describe a novel approach to answering and utilizing the answers to questions of this form when asked not of a human agent , but of a reinforcement learning agent .our approach

is not based solely on the deployment of techniques from the typical machine learning toolbox , as we make crucial use of smt - solving , which is more familiar to researchers in the field of formal methods .in the theoretical development , we capture our use of this technology via the abstraction of what we are calling introspection oracles : oracles that may give us direct access to sets of (state , action) pairs satisfying fixed constraints with respect to the policy network .our algorithm then uses this data to train so as to improve the safety of the agent"

10.2 google/pegasus-large

Pre-Train:
"Title: Introspection Learning Domains: Mathematics introduction: one notable feature of human learners is that we are able to carry out counter - factual reasoning over unrealized events .that is , we contemplate potential answers to questions of the form , Ž01c what would i do in situations inlineform0 , inlineform1 , and inlineform2 ?"

Fine-Tuned:
"we propose a novel approach to answering and utilizing the answers to questions of this form when asked not of a human agent , but of a reinforcement learning agent .our approach is not based solely on the deployment of techniques from the typical machine learning toolbox , which is more familiar to researchers in the field of formal methods .in the theoretical development , we capture our use of smt - solving technology via the abstraction of what we are calling introspection oracles .by querying the oracle during training it is possible to generate (state ,action) -pairs capturing failures / strengths of the agent with respect to properties of interest .for instance , if there are certain \u201c obviously wrong \u201d actions that the agent should"

10.3 google/bigbird-pegasus-large-arxiv

Pre-Train:
"in this paper , we describe a novel approach to answering and utilizing the answers to questions of this form.our approach is not based solely on the deployment of techniques from the typical machine learning toolbox , as we make use of smt - solving , which is more familiar to researchers in the field of formal methods.our algorithm then uses this data to train so as to improve the safety of reinforcement learning ."

Fine-Tuned:
"in this paper , we describe a novel approach to answering and utilizing the questions of this form when asked not of a human agent , but of a learning agent .our approach is not based solely on the deployment of techniques from the typical machine learning toolbox , as we make use of smt - solving , which is more familiar to researchers in the field of formal methods.our algorithm then uses this data to train so as to improve the safety of the safety .by querying the oracle during training it is possible to generate (state , action)-pairs satisfying fixed constraints with respect to properties of interest .for instance , if there are certain obvious dangers (in the case of bad examples) ,"

10.4 pszemraj/led-large-book-summary

Pre-Train:
"thea: and to of"

Fine-Tuned:
"thea: and to of fillse int- is de for \u2019i that youd I withn on'o are iten be The as yourl (or have at from an was thiser lamring can! will by? notre) wey und has all die but our their A more un dercuin so they one about myul which \u00e0 In/hef le out also des It up \" time \u0103if This Wep do \u2013 \u201conh sile les \u00een his who likeb when; been otherly \"g cu care what newor some get were just there wouldS them any).al into me had se makeat than du over You how no peoplean \u201d \u00e9it"

10.5 TinyLlama/TinyLlama-1.1B-Chat-v1.0

Pre-Train:
"in the presence of such situations .in summary , our approach is a novel way of using smt-solving technology to answer questions of introspection learning , and we believe that it has important implications for the development of safe and robust reinforced learning agents."

Fine-Tuned:
". \n \nrelated work: in this section , we provide a brief overview of related work in the area of introspection learning .in particular , we focus on the use of introspection oracles in the context of reinforcement learning , and in particular , in the context of policy optimization .in the context of policy optimization , the use of introspection oracles has been explored in a number of works , including , "

10.6 allenai/led-large-16384

Pre-Train:
"SumSummarize the following scientific article and create the abstract.Title: Introspection Learning: one notable feature of a novel approach to answering and utilizing the answers to questions of this form when asked not of a human agent , but of a reinforcement learning agent , which is not based solely on the deployment of techniques from the typical machine learning toolbox , as we make crucial use of the use of smt - solving technology via the abstraction of what we are calling introspection oracles : oracles that may give us direct access to sets of (state , action) pairs satisfying fixed constraints with respect to the policy network .by querying the oracle during training it is possible to generate failures / strengths of the agent .our algorithm then uses this data to train so as to improve the safety of the agents and without requiring that such potentially dangerous or costly situations be encountered in real life .it is true that"

Fine-Tuned:
"in this paper , we describe a novel approach to answering and utilizing the answers to questions of this form when asked not of a human agent , but of a reinforcement learning agent .our approach is

not based solely on the deployment of techniques from the typical machine learning toolbox , as we make crucial use of smt - solving technology via the abstraction of what we are calling introspection oracles : oracles that may give us direct access to sets of (state , action) pairs satisfying fixed constraints with respect to the policy network .by querying the oracle during training it is possible to generate"

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