1. OPTIMAL TRACING AND REPLAY FOR DEBUGGING MESSAGE-PASSING PARALLEL PROGRAMS

摘要：A common debugging strategy involves reexecuting a program (on a given input) over and over, each time gaining more information about bugs. Such techniques can fail on message-passing parallel programs. Because of nondeterminacy, different runs on the given input may produce different results. This nonrepeatability is a serious debugging problem, since an execution cannot always be reproduced to track down bugs. This paper presents a technique for tracing and replaying message-passing programs. By tracing the order in which messages are delivered, a reexecution can be forced to deliver messages in their original order, reproducing the original execution. To reduce the overhead of such a scheme, we show that the delivery order of only messages involved in races need be traced (and not every message). Our technique makes run-time decisions to detect and trace racing messages and is usually optimal in the sense that the minimal number of racing messages is traced. Experiments indicate that only 1% of the messages are often traced, gaining a reduction of two orders of magnitude over traditional techniques that trace every message. These traces allow an execution to be reproduced any number of times for debugging. Our work is novel in that we adaptively decide what to trace, and trace only those messages that introduce nondeterminacy. With our strategy, large reductions in trace size allow long-running programs to be replayed that were previously unmanageable. In addition, the reduced tracing requirements alleviate tracing bottle-necks, allowing executions to be debugged with substantially lower execution time overhead.

2. Planning based Guided Reconstruction of Corner Cases in Architectural Validation

摘要：Validation of modern microprocessors is a time consuming as well as complex process where constraint-based random test inputs are used to sensitize and monitor whether the hardware execution logic exhibits the desired micro-architectural event sequences. Such testing methods often lead to bug scenarios revealed as simulation traces which serve as the basis for patching the RTL code in order to fix a possible bug. However, the bug fix can be local in nature in the sense that the bug may possibly manifest itself in an alternate execution trace.

The present work leverages AI planning to develop techniques for automatic construction of test programs for sensitizing deep architectural bugs by reproducing a bug scenario as different possible sequences of micro-architectural events given that the scenario was initially observed as one such sequence in a simulation trace. Automated generation of such test programs 1) help to evaluate the robustness of a given bug fix or alternatively 2) identify the root cause of the bug so that a proper fix can be carefully planned.

3. An automatic short-answer grading model for semi-open-ended questions

摘要：Automatic short-answer grading has been studied for more than a decade. The technique has been used for implementing auto assessment as well as building the assessor module for intelligent tutoring systems. Many early works automatically grade mainly based on the similarity between a student answer and the reference answer to the question. This method performs well for closed-ended questions that have single or very limited numbers of correct answers. However, some short-answer questions ask students to express their own thoughts based on various facts; hence, they have no reference answers. Such questions are called semi-open-ended short-answer questions. Questions of this type often appear in reading comprehension assessments. In this paper, we developed an automatic semi-open-ended short-answer grading model that integrates both domain-general and domain-specific information. The model also utilizes a long-short-term-memory recurrent neural network to learn the representation in the classifier so that word sequence information is considered. In experiments on 7 reading comprehension questions and over 16,000 short-answer samples, our proposed automatic grading model demonstrates its advantage over existing models.

4. DFM: A parameter-shared deep fused model for knowledge base question answering

摘要：Currently, Knowledge Base Question Answering (KBQA) is an important research topic in the fields of information retrieval (IR) and natural language processing (NLP). The most common questions asked on the Web are simple questions, which can be answered by a single relational fact in a knowledge base (KB). However, answering simple questions automatically remains a challenging task in the IR and NLP research communities. Based on a review of various studies and a detailed analysis, we surmise that these challenges are primarily related to the following concerns: (1) how to effectively access a large-scale KB; and (2) how to effectively reduce the gap between NL questions and the structured semantics in a KB. Most previous studies have considered these as separate and independent sub tasks, subject detection and predicate matching. Here, we propose a deep fused model that combines subject detection and predicate matching under a unified framework. Specifically, we employ a subject detection model to recognize the subject entity in a question, and a multilevel semantic model to learn the semantic representations for questions and predicates. These models share parameters, and can be trained jointly. We evaluated the proposed method on both English and Chinese KBQA datasets. The experimental results demonstrate that the proposed approach significantly outperforms state-of-the-art systems when applied to both datasets.

5. Presbylarynx: Is it Possible to Predict Glottal Gap by Cut-Off Points in Auto-Assessment Questionnaires?

摘要：PURPOSE: To determine cut-off points in auto-assessment questionnaires to predict the presence and extent of presbylarynx signs.

METHOD: This case control, prospective, observational, and cross-sectional study was carried out on consecutive subjects observed by Otorhinolaryngology, in a tertiary center, in 2020. Each subject underwent fiberoptic videolaryngoscopy with stroboscopy, and presbylarynx was considered when it was identified two or more of the following endoscopic findings: vocal fold bowing, prominence of vocal processes in abduction, and a spindle-shaped glottal gap. Each subject completed three questionnaires: the Voice Handicap Index (VHI), with 30 and 10 questions, and the "Screening for voice disorders in older adults questionnaire" (RAVI).

RESULTS: The studied population included 174 Caucasian subjects (60 males; 114 females), with a mean age of 73.99 years (standard deviation=6.37; range 65-95 years). Presbylarynx was identified in 71 patients (41%). Among patients with presbylarynx, a glottal gap was identified in 22 patients (31%). The mean score of VHI-30 between "no presbylarynx" and "presbylarynx" groups was statistically different (P < 0.001), with a higher score for subjects with signs of presbylarynx. The presence of glottal gap was associated to a higher mean score of VHI-30 (41.64 ± 11.87) (P < 0.001). The mean score of VHI-10 between "no presbylarynx" and "presbylarynx" groups was statistically different (P < 0.001), with a higher score for subjects with signs of presbylarynx. Among patients with presbylarynx, the presence of glottal gap was associated to higher mean score of VHI-10 (14.04 ± 3.91) (P < 0.001). There was a strong positive correlation between VHI-30 and VHI-10 (rs=0.969; P < 0.001). The mean score of RAVI between "no presbylarynx" and "presbylarynx" groups was statistically different (P < 0.001), with a higher score for subjects with signs of presbylarynx. Among patients with presbylarynx, the presence of glottal gap was associated to a higher mean score of RAVI (11.68 ± 1.61) (P < 0.001). There was a strong positive correlation not only between RAVI and VHI-30 (rs=0.922; P < 0.001), but also between RAVI and VHI-10 (rs=0.906; P < 0.001). The optimal cut-off points to discriminate "no presbylarynx" from "presbylarynx", obtained by the Youden' index, were 3.5 for RAVI, 4.5 for VHI-30 and 1.5 for VHI-10. RAVI had the highest sensitivity and specificity. The optimal cut-off points to predict glottal gap, obtained by the Youden' index, were 9.5 for RAVI, 21 for VHI-30 and 7.5 for VHI-10.

CONCLUSION: The optimal cut-off points do discriminate "no presbylarynx" from "presbylarynx" were 3.5 for RAVI, 4.5 for VHI-30 and 1.5 for VHI-10. RAVI had the highest sensitivity and specificity, probably because it was designed specifically for vocal complaints of the elderly. Among patients with presbylarynx, cut-off points of 9.5 for RAVI, 21 for VHI-30 and 7.5 for VHI-10 were determined to predict patients with and without glottal gap. It was found a strong positive correlation between RAVI, VHI-30 and VHI-10. Thus, VHI-10 can be preferred to VHI-30 to assess voice impairment in clinical practice, because for elderly patients it is easier to answer. However, to predict endoscopic signs of presbylarynx, RAVI should be preferred.

6. Automated planning for finding alternative bug traces

摘要：Bug traces serve as references for patching a microprocessor design after a bug has been found. Unless the root cause of a bug has been detected and patched,

variants of the bug may return through alternative bug traces, following a different sequence of micro-architectural events. To avoid such a situation, the verification engineer must think of every possible way in which the bug may return, which is a complex problem for a modern microprocessor. This study proposes a methodology which gleans high-level descriptions of the micro-architectural steps and uses them in an artificial Intelligence planning framework to find alternative pathways through which a bug may return. The plans are then translated to simulation test cases which explore these potential bug scenarios. The planning tool essentially automates the task of the verification engineer towards exploring possible alternative sequences of micro-architectural steps that may allow a bug to return. The proposed methodology is demonstrated in three case studies.

7. Associativity, auto-reversibility and question-answering on Q'tron neural networks

摘要：Associativity, auto-reversibility and question-answering are the three intrinsic functions to be investigated for the proposed Q'tron Neural Network (NN) model. A Q'tron NN possesses these functions due to its property of local-minima free if it is built as a known-energy system which is equipped with the proposed persistent noise-injection mechanism. The so-built Q'tron NN, as a result, will settle down if and only if it 'feels' feasible, i.e., the energy of its state has been low enough truly. With such a nature, the NN is able to accommodate itself 'everywhere' to reach a feasible state autonomously. Three examples, i.e., an associative adder, an N-queen solver, and a pattern recognizer are demonstrated in this paper to highlight the concept.

8. Short Answer Scoring in English Grammar using Text Similarity Measurement

摘要：Assessment in educational institution is an important system to evaluate academic performance among students. The assessment is done by teacher either manually or using automated scoring technology. This study employed natural language processing approach to automated short answer scoring system using textual similarity. There are various types of questions in an examination paper. These include multiple choices question, short answer based question, fill-in-the-blanks questions and essay questions. In this study, the focus is on fill-in-the-blanks questions type. Students are required to answer each question with 2-5 words. The scope of the subject is narrowed to English grammar for secondary school as a datasets for this study. The datasets included 240 responses for 10 questions selected randomly. Students' answers are mapped with model answers to measure the textual similarities. The mappings were done using Levenshtein distance (LD) and Cosine similarity measures. Both textual similarity techniques assigned marks to each response according to the similarity distance of student answer and model answer. Certain range of distance values is restricted for both textual similarity techniques. The effectiveness of textual similarity in scoring short based answer is compared with human grader scoring. Both textual similarity techniques show high agreement with

human grader for assigning full marks where the maximum percentage is 92 and 94 percent for LD and Cosine similarity respectively. This work should be useful to assist teacher to ease the onerous task of grading.

9. 试题得分概率和答题时间概率分布自适应学习整定

摘要：无纸考试系统理想的组卷方式是根据试题得分概率和答题时间概率分布自动组卷，使所组卷子的预期考试成绩和答题时间数学期望和方差符合要求。自动随机组卷的考试质量严重地依赖于试题库试题的得分概率和答题时间概率分布的准确程度。试题库的得分概率和答题时间都是由有经验教师指定，并一经指定就不再变化。这样的方式存在三个问题，一是靠经验指定必然有偏差；二是成绩分布不能适应考试群体接受情况的变化；三是考试时间估计不准，或者过于集中或者过于离散。为此，论文根据大数定律中的贝努利定理(Bemoulli theorem)和机器自学习思想，提出试题库试题得分概率和答题时间自适应学习整定思想。

10. 基于结构化问句实例的自动问答系统

摘要：研究了一种基于结构化问句实例分析问句的方法，设计了应用该方法时的各种语义知识及其表示，用 Xml 文档来管理领域知识，在这种知识结构上设计了一种答案抽取的方法。在此基础上，开发了 BAQS 的原型系统。实验表明方法可行，准确率和召回率可分别达到 82．05％和 91．95％。对问答系统的设计具有借鉴意义和继续深入研究的价值。

11. Research and implementation of Web-based Question-Answering System on majority courses

摘要：QA System is one of the important parts in web-based educational platform, which helps students to acquire knowledge. We propose a schema for Web-based Question-Answering System. It contains 3 modules; they are FAQ (Frequently Asking Questions) tree, directly questing and searching modules. The article describes each module's function and scheme in detail. We pay important attention to the computation of the similarity between the question which students asked and the sentences of auto abstract searched by searching engine on Internet. Three ways are adopted to choose the optimum one from auto abstracts. Then the system analyzes and filters the contents which the optimum is in, so that the most precise answer for question is given.

12. 智能答疑中问题相关度算法研究及系统实现

摘要：针对现有答疑系统缺乏智能性和人机交互不够友好的不足,提出了一个智能答疑系统实现方案.为提高系统中问题与答案的匹配准确程度,着重对问题相关度算法进行了研究,在自动分词后用关键词集合相似度来计算问题的相关度,通过有监督的机器学习 BP 模型建立一个适合智能答疑系统的学习模型来优化分词权值.实验证明,这种算法可以帮助智能答疑系统提高准确性和智能性,具有一定的实用价值.

13. A WWW-based question auto-answering system - Answer Web

摘要：Distance learning is a fast growing and very promising application based on the Internet. Question answering, as an indispensable part of teaching and learning activities, is a crucial component of distance learning environment. WWW-based question auto-answering is a perfect solution. This paper thoroughly discussed and implemented a question auto-answering system based on WWW, introduced the choosing of solution, its basic structure and implementation.

14. Statistical debugging using latent topic models

摘要：Statistical debugging uses machine learning to model program failures and help identify root causes of bugs. We approach this task using a novel Delta-Latent-Dirichlet-Allocation model. We model execution traces attributed to failed runs of a program as being generated by two types of latent topics: normal usage topics and bug topics. Execution traces attributed to successful runs of the same program, however, are modeled by usage topics only. Joint modeling of both kinds of traces allows us to identify weak bug topics that would otherwise remain undetected. We perform model inference with collapsed Gibbs sampling. In quantitative evaluations on four real programs, our model produces bug topics highly correlated to the true bugs, as measured by the Rand index. Qualitative evaluation by domain experts suggests that our model outperforms existing statistical methods for bug cause identification, and may help support other software tasks not addressed by earlier models.

15. Reusing Debugging Knowledge via Trace-based Bug Search

摘要：Some bugs, among the millions that exist, are similar to each other. One bug-fixing tactic is to search for similar bugs that have been reported and resolved in the past. A fix for a similar bug can help a developer understand a bug, or even directly fix it. Studying bugs with similar symptoms, programmers may determine how to detect or resolve them. To speed debugging, we advocate the systematic capture and reuse of debugging knowledge, much of which is currently wasted. The core challenge here is how to search for similar bugs. To tackle this problem, we exploit semantic bug information in the form of execution traces, which precisely capture bug semantics. This paper introduces novel tool and language support for semantically querying and analyzing bugs.

We describe OSCILLOSCOPE, an Eclipse plugin, that uses a bug trace to exhaustively search its database for similar bugs and return their bug reports. OSCILLOSCOPE displays the traces of the bugs it returns against the trace of the target bug, so a developer can visually examine the quality of the matches. OSCILLOSCOPE rests on our bug query language (BQL), a flexible query language over traces. To realize OSCILLOSCOPE, we developed an open infrastructure that consists of a trace collection engine, BQL, a Hadoop-based query engine for BQL, a trace-indexed bug database, as well as a web-based frontend. OSCILLOSCOPE records and up-loads bug traces to its infrastructure; it does so automatically when a

JUnit test fails. We evaluated OSCILLOSCOPE on bugs collected from popular open-source projects. We show that OSCILLOSCOPE accurately and efficiently finds similar bugs, some of which could have been immediately used to fix open bugs.

16. 基于 AOP 的软件运行轨迹捕获技术研究与实现

摘要：借助面向方面编程（AOP）的关注点分离思想，提出了基于 AOP 的软件运行轨迹捕获技术，它能在不改变源代码的情况下为系统注入运行轨迹捕获和运行行为监测功能，从而有效提高系统中监控模块的松耦合性。以该技术为基础实现了系统运行轨迹分析工具 SRT，该工具能够在改善系统模块性的同时，为软件轨迹监测、系统故障定位提供量化依据与可信性保障。

17. 基于卷积神经网络的自动问答

摘要：自动问答是自然语言处理领域中的一个研究热点，自动问答系统能够用简短、精确的答案直接回答用户提出的问题，给用户提供更加精确的信息服务. 自动问答系统中需解决两个关键问题：一是实现自然语言问句及答案的语义表示，另一个是实现问句及答案间的语义匹配.卷积神经网络是一种经典的深层网络结构，近年来卷积神经网络在自然语言处理领域表现出强大的语言表示能力，被广泛应用于自动问答领域中.本文对基于卷积神经网络的自动问答技术进行了梳理和总结，从语义表示和语义匹配两个主要角度分别对面向知识库和面向文本的问答技术进行了归纳，并指出了当前的研究难点.

18. 面向 OWL 知识的问答系统:Agile

摘要：问答系统因能提供方便的输入模式与更精确的答案而成为获取网络信息的重要手段。介绍了一个面向 OWL 知识的问答系统 Agile,并着重阐述了其在问题规范和字典生成方面的技术方案。为了得到合适的映射单位,Agile 定义了两个数据结构用于规范自然语言问题和 OWL 本体知识字典,并借助一些自然语言处理工具和 OWL 解析工具将两种源知识进行了形式化。和现有网络问答系统比较,Agile 不需要用户参与,能够处理的问题领域和形式更加丰富。

19. Restricted-Domain Chinese Automatic Question-Answering System based on question sentence similarity

摘要：It is an available pattern to implement auto answer in RDAQAS (Restricted-Domain Automatic Question-Answering System) through calculating the similarity of target question sentences and question sentences in question sentences corpus, and then finding the most similar question sentences, and retrieving the answer finally. All these above are based on HowNet and domain Ontology. This paper introduces the building of financial domain ontology and question sentences' corpus, then proposes the method to calculate similarity of question sentences based on Keyword Vector Space Method and Semantic Concept Vector Space Method. The procedure of realization is described in details. And the learning algorithm and learning course of getting question sentence semantic vectors based on the maximum entropy model also are introduced in detail. At last, the experimental comparing data

illustrates that the similarity calculation method based on semantic concept is more superior to that based on keyword.

20. Overcoming Data Limitation in Medical Visual Question Answering

摘要：Traditional approaches for Visual Question Answering (VQA) require large amount of labeled data for training. Unfortunately, such large scale data is usually not available for medical domain. In this paper, we propose a novel medical VQA framework that overcomes the labeled data limitation. The proposed framework explores the use of the unsupervised Denoising Auto-Encoder (DAE) and the supervised Meta-Learning. The advantage of DAE is to leverage the large amount of unlabeled images while the advantage of Meta-Learning is to learn meta-weights that quickly adapt to VQA problem with limited labeled data. By leveraging the advantages of these techniques, it allows the proposed framework to be efficiently trained using a small labeled training set. The experimental results show that our proposed method significantly outperforms the state-of-the-art medical VQA.

21. Automated Customized Bug-Benchmark Generation

摘要：We introduce BUG-INJECTOR, a system that automatically creates benchmarks for customized evaluation of static analysis tools. We share a benchmark generated using BUG-INJECTOR and illustrate its efficacy by using it to evaluate the recall of two leading open-source static analysis tools: Clang Static Analyzer and Infer.

BUG-INJECTOR works by inserting bugs based on bug templates into real-world host programs. It runs tests on the host program to collect dynamic traces, searches the traces for a point where the state satisfies the preconditions for some bug template, then modifies the host program to "inject" a bug based on that template. Injected bugs are used as test cases in a static analysis tool evaluation benchmark. Every test case is accompanied by a program input that exercises the injected bug. We have identified a broad range of requirements and desiderata for bug benchmarks; our approach generates on-demand test benchmarks that meet these requirements. It also allows us to create customized benchmarks suitable for evaluating tools for a specific use case (e.g., a given codebase and set of bug types).

Our experimental evaluation demonstrates the suitability of our generated benchmark for evaluating static bug-detection tools and for comparing the performance of different tools.

22. Use of Java Exception Stack Trace to Improve Bug Fixing Skills of Intermediate Java Learners

摘要：Today industry demands attention towards the software quality in the development process than only software delivery. The quality of software can be measured, monitored and tested during different phases of software development lifecycle. Major failures of software affect money as well as the reputation of a company. In this scenario, fixing bugs in less time is an important factor. Today's

challenge for engineering students is to have program writing skills as well as bug fixing skills and complete the task in stipulated time period. Here, we present the experiment on how bug fixing skills are improved. We have conducted the experiment during Java programming course for Third Year students of Information Technology discipline. This experiment was to use Java exception stack trace to find bugs in Java program and fix them in stipulated time. To test the effect of this experiment, a pre-test post-test experimental study along with perception survey was carried out. We found that more than 65% students were successful in fixing bugs in stipulated time and about 20% students were able to fix bugs, but not in stipulated time. About 80-85% students were in state to analyze and fix the bugs in program.

23. Unsupervised Sentence Embeddings for Answer Summarization in Non-factoid CQA

摘要：This paper presents a method for summarizing answers in Community Question Answering. We explore deep Auto-encoder and Long-short-term-memory Auto-encoder for sentence representation. The sentence representations are used to measure similarity in Maximal Marginal Relevance algorithm for extractive summarization. Experimental results on a benchmark dataset show that our unsupervised method achieves state-of-the-art performance while requiring no annotated data.

24. The Study and Implementation of The Subjective Question's Auto Marking Algorithm Based on The Artificial Intelligence

摘要：According to the difficulties and problems faced by the subjective question's auto marking system in the online examination system, the paper makes the studied results(such as Vector Space Model (VSM), Word Segmentation algorithm and so on) of the native language understand in the Artificial Intelligence apply in processing the subjective question's answer (including the standard answer and the student's answer) and then it used the text characteristic vector matching algorithm to auto mark those students exam paper by the computer system.

25. Mobile Medical Question and Answer System with Auto Domain Lexicon Extraction and Question Auto Annotation

摘要：Over the past several years, China has entered an open and comprehensive two-child era, which has caused a scarcity in the medical resources available to older pregnant. women.We have presented the MCQAs, which is a Chinese mother-to-child-domain question-answering system. We use deep learning as an algorithm for question classification, however, most of actual systems do not have labeled data 14 training deep learning models at initial. To solve those problems, in this paper, first we present an auto domain dictionary extraction method that combines the word vector and new word detection strategy. And then we automatically annotate unlabeled data, which solves the constraints of relying on a large number of labor and experts.

26. Group Sparse CNNs for Question Classification with Answer Sets

摘要：Question classification is an important task with wide applications. However, traditional techniques treat questions as general sentences, ignoring the corresponding answer data. In order to consider answer information into question modeling, we first introduce novel group sparse auto-encoders which refine question representation by utilizing group information in the answer set. We then propose novel group sparse CNNs which naturally learn question representation with respect to their answers by implanting group sparse autoencoders into traditional CNNs. The proposed model significantly outperform strong baselines on four datasets.

27. Research on E-Commerce Automatic Question Answering System Model Based on Data Mining

摘要：With the rapid development of the Internet and artificial intelligence, intelligent question answering systems have become current research hotspots because they can provide users with accurate answers and intelligent services. They are gradually entering the e-commerce field to replace some manual work. In this paper, we proposed several models including a user intent recognition model, a pattern of association rule mining model and a model of the entire e-commerce auto answering system. In addition, the application effects of these models were analysed. The models and analysis in this work are useful for constructing e-commerce automatic question answering system or making personalized recommendations and related services.

28. A formal semantics for program debugging

摘要：This work aims to build a semantic framework for automated debugging. A debugging process consists of tracing, locating, and fixing processes consecutively. The first two processes are accomplished by a tracing procedure and a locating procedure, respectively. The tracing procedure reproduces the execution of the failed test case with well-designed data structures and saves necessary information for locating bugs. The locating procedure will use the information obtained from the tracing procedure to locate ill-designed statements and to generate a system of fix-equations, whose solution will be used to fix the bugs. A structural operational semantics is given to define the functions of the tracing and locating procedures. Both of them are proved to terminate. The main task of fixing process is to solve the fix-equations. It turns out that for a given failed test case, there exist four types of fix-equations and three different solutions: 1) The bug is solvable, i.e., there exists a solution of the system of fix-equations, and the program can be repaired. 2) There exists a structural design error in the program, i.e., the system of fix-equations generated at each round of the locating procedure is solvable, but a new bug will arise when the old bug is being fixed. 3) There exists a logical design error, and the system of fix-equations is not solvable.

29. A bug reproduction approach based on directed model checking and crash traces

摘要：Reproducing a bug that caused a system to crash is an important task for uncovering the causes of the crash and providing appropriate fixes. In this paper, we propose a novel crash reproduction approach that combines directed model checking and backward slicing to identify the program statements needed to reproduce a crash. Our approach, named JCHARMING (Java CrasH Automatic Reproduction by directed Model checkING), uses information found in crash traces combined with static program slices to guide a model checking engine in an optimal way. We show that JCHARMING is efficient in reproducing bugs from 10 different open source systems. Overall, JCHARMING is able to reproduce 80% of the bugs used in this study in an average time of 19 min.

30. Convolutional auto encoders for sentence representation generation

摘要：In this study, we have proposed an alternative approach for sentence modeling problem. The difficulty of the choice of answer, the semantically related questions and the lack of syntactic closeness of the answers give rise to the difficulty of selecting the answer. The deep learning field has recently achieved a pivotal success in semantic analysis, machine translation, and text summaries. The essence of this work, inspired by the human orthographic processing mechanism and using multiple convolution filters with pre-rendered 2-Dimension (2D) representations of sentences, input or output size is to learn the basic features of the language without concerns. For this reason, the semantic relations in the sentence structure are learned by the convolutional variational auto-encoders first, and then the question and answer spaces learned by the auto-encoders are linked with proposed intermediate models. We have benchmarked five variations of our proposed model, which is based on Variational Auto-Encoder with multiple latent spaces and able to achieve lower error rates than the baseline model, which is the base Convolutional LSTM.