

Ministry of Education Intercollegiate AI CUP 2019 – Artificial Intelligence Analysis and Classification of Thesis

Introduction

How do you design a system that could appropriately analyze the algorithms used in a thesis? With the rapid innovation of computing technology, human work of theses tagging and classification has proven to be ever more inefficient and unfeasible. Inevitably, the employment of computers in the work of theses analysis would be a major attempt to reducing human workload, and could allow researchers to focus in more important and meaningful tasks.

The aim of this competition is to attempt to solve a problem that has troubled researchers for long: “How do you design a system that could automatically analyze the abstract of a thesis and summarize utilized, compared, or newly proposed algorithm used within the theses?”

Topic 2 [Classification of Thesis]

The contestants will be provided theses with the topic of Computer Science sourced from arXiv. The contestants should use the provided materials to predict the classification of a thesis into the following categories: **Theoretical Paper**, **Engineering Paper**, **Empirical Paper**, **Others**. Note that a thesis may have multiple classifications, e.g. a thesis may be both a Theoretical Paper and an Engineering Paper.

Application Regulations

1. Contestants over the age of 18 (and including) may participate in the competition. Contestants under the age of 18 are required to provide parental or guardian consent in order to apply for the competition. (Employees of Trend Micro are excluded from this competition.)
2. A participating team may comprise of 1 to 5 contestants.
3. A contestant may only apply for a single team. Contestants who has joined a team are not allowed to switch teams.
4. Participating teams are not allowed to change, add or reduce members past the application deadline.
5. During the course of competition, teams may not split or merge.
6. For academic grading purposes, contestants who are required by school curriculum to participate in the competition should follow curriculum regulations in regards to the naming of their team.

Eligibility and Regulations of Awards

1. The awards for this competition are 8 counts of “Student Group Leaderboards Award”, and 1 count of “Trend Micro Elite Award in Artificial Intelligence”.
2. Trend Micro Elite Award in Artificial Intelligence: The winner of this award must agree to the following conditions set by the organizers of the competition. Failure to comply will result in ineligibility for the award.
 - a. Regardless of the identity of the participants, this award is presented to the team with the highest score in the Private Leaderboards. This award may be

presented in tandem with the “Student Group Leaderboards Award” if the winning team is a Student Group.

- b. At least one member of the team must have Nationality, Working Visa or Student Visa of the Republic of China for the team to qualify for the award.
 - c. The prize will be awarded in New Taiwan Dollars transferred to a designated member of the winning team, who must own a valid bank account in Republic of China. The designated awardee must file for tax declaration in the Republic of China and endorse documentation regarding Tax Compliance and Agreement to Use of Personal Information.
 - d. The winning team is required to publicly disclose their work and related documents used in the competition within a set deadline.
 - e. A designated member of the winning team should participate in the Award Ceremony. Should no members of the winning team be available during the Awards Ceremony, a spouse or friend may substitute for the awardee on behalf of the winning team.
3. Student Group Leaderboards Award: The winner of this award must agree to the following conditions set by the organizers of the competition. Failure to comply will result in ineligibility for the award.
- a. At time of application, all contestants in a participating team must be a valid student in any College or University in the Republic of China to be eligible for the Student Group Leaderboards Award. Proof of Student Identity of all members should be submitted upon presentation of the award.
 - b. The prize will be awarded in New Taiwan Dollars transferred to a bank account designated by the winning team. The winning team are required to pay income taxes in accordance to Tax Regulations of the Republic of China.
 - c. The winning teams of the “Student Group Leaderboards Award” must submit the source code of their search model and a final report within a designated deadline as verification of their work. The content of the final report is subject to adjudication for the validity of the award. Errors and omission of information may result in ineligibility for the award.
 - d. The committee may administratively endorse supervising personnel of the winning team via an official letter to the Administrative Office of the personnel’s Institution. However, the supervising professor may not concurrently participate with the student in the competition. The name of the supervising professor should be provided on the submitted final report.
 - e. By adjudication by the organizing committee, the top 8 ranking teams for the “Student Group Leaderboards Award” will be presented with a Certificate of Award by the Ministry of Education.
 - f. The committee reserves the right to adjust the number of “Student Group Leaderboards Award” presented to the participating teams in regards to the numbers of submitted work and its results. Should no submitted work meet base standards, the committee reserves the right to void the presentation of the award.
 - g. The winning team is required to publicly disclose their work and related documents used in the competition within a set deadline.
 - h. A designated member of the winning team should participate in the Award Ceremony. Should no members of the winning team be available during the

Awards Ceremony, a spouse or friend may substitute for the awardee on behalf of the winning team.

- i. To aid in the review process of eligibility for participation and award, contestants are required to validate their registered Chinese name in their T-Brain account. Contestants who wish to modify their personal data may do so in the “My Profile” page in their T-Brain account.
4. Teams ranking in the top 25% and whose private score is above Baseline (Baseline: 0.69) will be presented with a Certificate of Competition Award by the Ministry of Education Artificial Intelligence Competition. The committee reserves the right to the adjudication of the winners of this award.

Scoring Regulations

1. The submitted work must be compliant with formatting regulations of the competition.
2. The Leaderboard System will evaluate the results of all submitted work.
3. During the course of competition, participating teams may use scores on the Public Leaderboard as reference.
4. On the last day of the competition, the Private Dataset will be published for the participating teams to be used for prediction and uploading of their results. At the end of the competition, results on the Private Leaderboard will be announced, ranked by the results of a team’s last uploaded Private Dataset prediction.

Scoring Methods

Micro F1 Score

$$\text{Precision} = \frac{\sum_{i=1}^4 TP_i}{\sum_{i=1}^4 TP_i + FP_i}$$

$$\text{Recall} = \frac{\sum_{i=1}^4 TP_i}{\sum_{i=1}^4 TP_i + FN_i}$$

$$\text{micro F1} = \frac{2 \times (\text{Precision} \times \text{Recall})}{(\text{Precision} + \text{Recall})}$$

1. TP_i : True Positive of Category i
2. FP_i : False Positive of Category i
3. TN_i : True Negative of Category i
4. FN_i : False Negative of Category i
5. In Topic 2, the categories are Theoretical, Engineering, Empirical, Others

Competition Regulations

1. A team is limited to 2 Public Dataset uploads per day and 10 Private Dataset uploads on 12/30.
2. Competing teams may use additional open-source kits and resources to aid in their simulation. However, tagging and classification must be done via Machine Learning and artificial tagging by human is forbidden. Additional resource used must be in public access, open source, or for institutional use. Citations must be provided for reference purposes by the committee, and the organizing committee reserves the final right to adjudication on the validity of use of such resources.
3. Teams are not allowed to use closed source Auto Machine Learning modeling components.
4. Teams are forbidden from privately sharing programs and values. However, public discussions on the official forums are allowed.
5. The organizing committee reserves the right to adjust the dataset should the needs arise.
6. The organizing committee may terminate a contestant's right to participation and eligibility for award if any of the following actions are to be found in their team:
 - a. With evidence beyond reasonable doubt, the team is proven to be cheating, plagiarizing, or is engaging in dishonest behavior.
 - b. With evidence beyond reasonable doubt, the team has infringed on the copyright of another party.
 - c. With evidence beyond reasonable doubt, the team has initiated an attack on the Leaderboards System.
 - d. With evidence beyond reasonable doubt, the team has engaged in anticompetitive behavior causing disruption to other competing teams.
 - e. With evidence beyond reasonable doubt, the team has breached the terms and regulations of the competition, terms of service of the "T-Brain AI Competition Platform", or contestant terms of the "Ministry of Education Machine Reading Open Competition".
7. The organizing committee of the competition reserves the right to explication of the competition regulations and the right to adjudication.

Prizes

Trend Micro Elite Award in Artificial Intelligence: 100,000 New Taiwan Dollars
Student Group Leaderboards Champion: 100,000 New Taiwan Dollars
Student Group Leaderboards 2nd Runner Up: 60,000 New Taiwan Dollars
Student Group Leaderboards 3rd Runner Up: 40,000 New Taiwan Dollars
Student Group Leaderboards Honorable Mention: 10,000 New Taiwan Dollars
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In addition to the top 8 ranking award for the Student Leaderboard Group, teams ranking in the top 25% and whose private score is above Baseline (Baseline: 0.69) will be presented with a **Certificate of Competition Award**.

Timetable

Item	Time	Note
Application	2019/9/16 – 2019/12/23	Contestants may apply for the competition during this period of time.
Course of Competition	2019/9/16 – 2019/12/30	Participating teams may upload their results, which will be evaluated by the Leaderboards system.
Prediction of Private Dataset	2019/12/30	The Private Dataset will be available for download at 8:00. Prediction results for the Private Dataset may be uploaded from 8:00 to 20:00, with a maximum of 10 uploads limited to each team.
Publication of Results	2019/12/31	The Private Leaderboard will be published once the deadline for uploading of results has passed.
Submission of Report	2020/1/10	The winning teams should submit their final report on the predictive model and its source code.
Announcement of Final Rankings	2020/1/15	The final team rankings will be announced.
Awards Ceremony	Early 2020	Exact date and information to be announced.

Main Organizers: Ministry of Education Artificial Intelligence Competition and Tagging and Data Collection Workshop

The “Artificial Intelligence Competition and Tagging and Data Collection Workshop” is a subproject of the Ministry of Education Artificial Intelligence Technology Leadership Program. The program establishes competition topics for a yearly AI competition, and works together with school curriculum to aid in the instructor’s teaching of real-world application of theories. The competition material is highly relevant to actual real-world usage, in contrast to simpler materials used in teaching; As such, students should engage in critical thinking in order to reach their goals. The AI competition will undergo strict judgement by the organizing committee and rewards will be presented to the prevailing teams in order to encourage participation and cultivation of talents in the use of AI.

Directors: Department of Information and Technology Education, Ministry of Education

The Ministry of Education Department of Information and Technology Education operates with the vision of “Integrating Information, Technology and Humanity, and leading

education institution into a new age of sustainable development". With the 5 goals in mind: "Prospective cultivation of talents", "Refining of digital learning", "Scientific research of ethic literacy", "Concern in public issues about digital life", "Sustainment of campus environment", we plan to establish a learning environment centralized around "People", and to cultivate citizens that engage in society and strengthens the sustainable development of the country.

Source of Topic: Department of Computer Science and Information Engineering, National Taiwan University

Founded in 1977, the Department of Computer Science and Information Engineering (CSIE) began with the undergraduate program. In 1981, the Master of Science program was founded; the Ph.D. program began in 1984. The department thus offers a complete lineup of degree programs in education and research. Each year the department admits about 120 undergraduates, 140 Master's students and 35 Ph.D. students. As of the 2007 academic year, CSIE has 494 undergraduates, 384 Master's students, and 182 Ph.D. students, totaling 1060 students.

The department is housed in a modern building. With state-of-the-art facilities and a strong faculty, the department has a leading academic position not only in Taiwan, but also among the top programs world-wide. The department has organized several international conferences and has been recognized for its achievements in various international competitions, including the gold medal in Chinese Chess at both the 6th and 7th Computer Olympiads, the 1st place in the 2003 Computer Society International Design Competition (CSIDC), the 6th place in the ACM ICPC World Finals in 2004, the gold medal in the International Open Source Embedded Software Competition (IOSESC) in 2006, and the 14th place in the ACM ICPC World Finals in 2007.

The undergraduate program is designed for students whose major interest is in computer science. It gives the student the opportunity to obtain a broad knowledge of computer science and the freedom to tailor the program according to the student's individual needs. Courses focus on Computer Science and Information Engineering basics such as Data Structure & Algorithm, Engineering/Discrete Mathematics, Programming/Assembly Languages, Operating System and Computer Architecture. With our programs for the Master Degree, we aim at training a group of professional computer engineers to teach or conduct research in the future. The programs for the Doctoral Degree bring the students to an advanced level of computer science, studying the most state-of-the-art technology in computer science.

Sponsors: Trend Micro

Trend Micro is a global leader in cybersecurity solutions, with the unwavering vision of making the world safe for exchanging digital information. We provide solutions for consumers, enterprise and government institution, including multilayered cybersecurity solutions for data centers, cloud computing, servers and terminals. Our products communicate with each other to provide a tightly integrated protection system and a centralized environment for threat control and investigation. Trend Micro has over 6,000 employees in 50 countries around the globe. With a renovating Cybersecurity Research and Intelligence Center, Trend Micro is the trusted partner for enterprise network security.

Q&A

If you have any questions about the competition, feel free to ask in the [Discussion Forum](#). You may also relay your questions via email to t_brain@trendmicro.com.

Courses

Courses for the AI CUP, organized by the competition committee, will be available free of charge. Contestants who are interested in such courses may follow on our updates on the [AI CUP website](#), or follow our [FB page](#) for more information.