

## AI CUP 2024

### Competition to predict power generation based on regional microclimate data

#### Competition description

The power generation of solar photovoltaic devices is closely related to the microclimate. In addition to solar radiation, temperature and humidity will affect the photoelectric effect of solar photovoltaic devices, and wind will affect temperature and humidity. Moreover, the impact of dustfall and rainfall must be taken into consideration. Hualien has a vast territory and various complex topography. In this project, we will set up various sensors and solar photovoltaic devices in various terrains to establish microclimate data sets of different regions and collect the power generation of solar photovoltaic devices. The information is used for this competition. In this competition, we provide regional microclimate data and photovoltaic power generation collected at 17 locations in 2024 as training data. The content of the competition is to predict the power generation wattage at the specified time and location, and the error value is used as the basis for ranking.

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#### Registration specifications

1. Current students (both graduate students and high school students) or who are over 18 years old at the time of registration can sign up. If you are a minor under the age of 18, you can sign up with the consent of your legal guardian. (Except for Trend Micro employees) .
  2. The number of participating teams is 1 to 4 people.
  3. Participants can only join one participating team, and once they join a team, they cannot change teams.
  4. After the registration deadline, the list and number of team members cannot be changed.
  5. During the competition, teams cannot be merged or divided.
  6. Participants who participate in the competition based on school curriculum requirements should fill in the course code in the registration system and follow the team formation requirements of the course to facilitate class scoring.
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#### Registration method

1. Each member of the registered team must register as a member with a Google or Facebook account at "T-Brain AI Practice Bar" (<https://tbrain.trendmicro.com.tw/>).
2. log in to the "AI CUP Registration System" (<https://go.aicup.tw/>) and fill in each member's information one by one according to the items shown on the registration page (Note 1), and complete the team formation process to log in to the competition.
3. The next working day after the team completes the competition login in the "AI CUP Registration System", each team member can participate in this competition at the "T-Brain AI

Practical Bar".

4. The participating groups are divided into student group and non-student group. The student group requires all members of the team to be students; as long as there is one non-student in the team, the entire team will be a member of the non-student group.
5. After registration, each contestant is asked to help fill out the "Power Generation Prediction Competition Based on Regional Microclimate Data - Pre-test Questionnaire".  
Pre-test questionnaire URL <https://forms.gle/zNusnZExKgebcTWK6>
6. After the competition, contestants are asked to help fill out the "Power Generation Prediction Competition Based on Regional Microclimate Data - Post-test Questionnaire".  
Post-test questionnaire URL <https://forms.gle/qMb1iH7ZjSDUm5Y8>

Note 1: The registration system process description can be viewed on the AI CUP official website.

( <https://www.aicup.tw/> ) (relevant website → AI CUP registration system process) or go to the download area to download the registration process description document. For the email in the team member information, please fill in the email registered by each team member in "T-Brain AI Practice Bar". If the email filled in on the registration page does not match the email in "T-Brain AI Practice Bar", the registration will be deemed to be invalid.

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## Eligibility and methods for receiving prizes

1. This award includes 13 "Student Group Ranking Awards" and 5 "Trend Technology Artificial Intelligence Creativity Awards" .
2. Student Group Ranking Award (Note 2) : The winning team agrees to assist the organizer with the following arrangements, otherwise it will lose its qualification to receive the award.
  - All members of the team must be current students in various colleges and universities in the Republic of China (Taiwan) from the day of registration to the deadline for uploading answers to the competition test set . Only then will the participating team be eligible to receive the award in the student group, and relevant supporting documents will be attached when awarding the award.
  - Prizes will be distributed by remittance in New Taiwan Dollars. Winning teams that meet the registration requirements and are eligible to receive the prizes should nominate a team member representative with a local New Taiwan Dollar account to receive the prizes, and use this team member to pay the relevant income tax as a tax filer in the Republic of China (Taiwan) through this team member, and sign documents related to taxation, use of personal information, receipts, etc. in accordance with regulations.
  - the original code and final report that can reproduce the model before the specified deadline to verify the results.
  - The evaluation items for the final results include two parts: (1). The team 's ranking on the Private Leaderboard , accounting for 70% ; and (2). The report submitted by the team before the announcement deadline, accounting for 30 % . Both are the actual basis for winning the award. However, the winning team must be among the top 25% of the Private Leaderboard

and have a score exceeding the baseline score set by the jury team (no more than 30 teams). The team must submit a report within the prescribed time limit and pass the review of the jury team.

- The report should contain the content items specified by the organizer, and the evaluation criteria include three parts: (1). Report completeness (10%) , (2). Report accuracy (10%) , and (3). Program originality (10%) . A review team composed of expert committee members from the Artificial Intelligence Competition and Annotation Data Collection Project Office of the Ministry of Education will conduct the scoring. If the report is still missing after the deadline, or it is submitted after the deadline, it will not be supplemented, revised, or graded.
- Any member of the winning team of the "Student Category Ranking Award" has won the "Ministry of Education National Artificial Intelligence Competition in Colleges and Universities (AI CUP)" organized by the "Artificial Intelligence Competition and Labeling Data Collection Project Office of the Ministry of Education". If the top three teams (including first to third place, gold/silver/bronze medals) have outstanding results three times (including above), if they win again in the competition, the team will only be awarded a certificate from the Ministry of Education and no bonus will be given. The bonus will be given to the next-placed team, and the two teams will be tied for the same ranking. This provision is not retroactive, and the cumulative number of awards will be calculated from the 2022 Autumn Competition.
- the Private Leaderboard rankings; and the teams (no more than 30 teams) whose results exceed the baseline score set by the jury team will be approved after the review team reviews the report and will be provided with a Certificate of Education from the Ministry of Education in accordance with the competition regulations. Electronic version of the certificate from the Artificial Intelligence Competition Project Office. However, the supervisor is not allowed to register together with the student. Please fill in the name of the supervisor in the registration system and final report.
- Private Leaderboard ranking refers to the teams that have submitted answers and completed the event and obtained Private Leaderboard points before they are included in the ranking. Teams that fail to submit answers within the prescribed time limit / teams that fail to submit answers without correction will be deemed to have abandoned the competition and will not be included in the overall ranking.
- The winning team that is awarded the "Student Category Ranking Award" will receive a Certificate of Education from the Ministry of Education after being reviewed by the organizer's review committee. The personal information of the winning team members will be based on the information filled in the registration system (the last modification period of the information is the same as the report receipt deadline), and this will be used as the basis for producing certificates and issuing awards.
- The number of each award in the "Student Category Ranking Award" may be adjusted

based on the number of entries and results. If the entries do not meet the standard, the final selection review committee of the organizer may decide to adjust / revoke the ranking, fill in a vacancy, or be shortlisted.

- the "Student Category Ranking Award" must agree to the competition guidance unit and competition planning unit to use or share the report or program code submitted by the outstanding winning team for non-profit purposes such as teaching, talent cultivation, or academic research. .
  - The winning team must nominate at least one representative to participate in subsequent awards activities and share presentations as informed by the organizer . If there are no teammates to assist, you can ask a relative or friend to attend as a representative to receive the award and share the presentation. Also, the winning team need to agree that the competition guidance unit and competition planning unit will use or share the outstanding winning teams for non-profit purposes such as teaching, talent cultivation, or academic research. Submitted presentations and published videos.
  - Due to the requirements for registration qualification review and award information review, please confirm that the name registered in the T-Brain account is the correct Chinese name. If necessary, you can make corrections in the My Profile function of the T-Brain account.
3. Trend Micro Artificial Intelligence Creativity Award: The winning team agrees to assist the organizer with the following arrangements, otherwise it will lose its qualification to receive the award.
- This award is not limited to the identity of the participant and can be received at the same time as the student group ranking award .
  - There are five creative awards, and each winning team will receive a cash prize of NTD 20,000. At least one person in the team must have the nationality of the Republic of China (Taiwan), or a work or student visa of the Republic of China (Taiwan), so that the participating team is eligible to receive the prize.
  - The selection of this award will only take the reported results into account. The winning team must be among the top 30 teams in the Private Leaderboard rankings, submit reports and implementation procedures within the prescribed time limit , and pass the review of the review committee team. The award may be awarded by the organizer's final selection committee, or if there is a shortage of candidates.
  - Contestants must write in accordance with the regulations of " Forecasting Power Generation Based on Regional Microclimate Data\_Report Writing Instructions", and an excellent report template will also be provided for reference. The review will be based on five items : the report's completeness and fluency , correctness , originality , combination of green energy knowledge and skills , and whether it has the potential to publish a seminar paper . If the judging results didn't meet requirement, the award will be voided.
  - At least one person in the team must have the nationality of the Republic of China



- (Taiwan), or a work or student visa of the Republic of China (Taiwan). Only then will the participating team be eligible to receive awards in the general category.
- Prizes will be distributed by remittance in New Taiwan Dollars. Winning teams that meet the registration requirements and are eligible to receive the prizes should nominate a team member representative with a local New Taiwan Dollar account to receive the prizes, and the team member shall be the tax filer of the Republic of China (Taiwan) and sign in accordance with regulations including documents related to taxation, use of personal information, etc.
  - The winning team must nominate at least one representative to participate in subsequent awards activities and share presentations as informed by the organizer . If there is no teammate to assist, you can ask a relative or friend to attend on behalf of you to receive the award and share the presentation.
4. The top 25% of the teams (no more than 30 teams) ranked in the Private Leaderboard will receive an electronic certificate from the Artificial Intelligence Competition Project Office of the Ministry of Education after they submit their reports in accordance with the regulations and are reviewed by the organizer's review committee.

**Note 2 :** If there are any non-student groups in the top 13 , the student group ranking award places will be filled in order of ranking, and the Ministry of Education certificate and bonus will be received.

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**Scoring criteria**

1. Please use .csv files to submit files , and the content format must comply with the competition format regulations . Please use UTF-8 (without BOM file header) encoding when uploading file content, and use Unix system newline characters. Please do not use other Non-Printable Characters to avoid the possibility of scoring failure.
  2. The Leaderboard system will evaluate each submission result, and the one with the highest score will be presented on the Leaderboard. If the participating teams have the same score, the ranking order will be determined based on the submission time.
  3. During the competition, participating teams can go to Leaderboard and Submission History to confirm the evaluation scores uploaded each time for reference. The score of each evaluation will be provided in Submission History .
  4. All Private evaluation scores will not be announced during the competition. After the competition, the results of the Private Leaderboard will be announced separately, and the results and the required report will be used as the basis for ranking.
  5. Private Leaderboard ranking refers to the teams that have submitted answers and completed the event and obtained Private Leaderboard points before they are included in the ranking. Teams that fail to submit answers within the prescribed time limit / teams that fail to submit answers without correction will be deemed to have abandoned the competition and will not be included in the overall ranking.
  6. The competition test set Dataset will be available for download at 11:00 am on 11/18 ( Monday ) , and you can start uploading answers at the same time.
  7. The prediction results of the competition test set Dataset can be uploaded from 11:00 am on 11/18 ( Monday ) until 23:59:59 pm on November 28 (Thursday). No score will be given if it exceeds the time limit. During this period, the maximum number of daily uploads is 5. Please note that the number of daily uploads is calculated based on files.
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## Scoring method

each prediction data with the correct data and calculate the error ( **take the absolute value** ), and add all the errors together, and use the total error value as the basis for ranking. The smaller the total error, the **higher the ranking**.

The scoring formula is as follows:

Assume that there are  $n$  total of prediction data, the correct answer for each data is  $S_i$ , and the contestant's answer is  $A_i$  (where  $i=1,2,\dots, n$ ).

$$\text{Total score} = \sum_{i=1}^n |A_i - S_i|.$$

**The lower the total score, the higher the ranking .**

example:

There are 5 predictions in total. The correct power generation is  $S = [5,10,15,20,25]$ . The answer for contestant 1 is  $A_1 = [1,2,3,4,5]$  and the answer for contestant 2 is  $A_2 = [30,40,50,60,70]$

Then the total score of contestant 1 is  $4+8+12+16+20=60$

The total score of contestant 2 is  $25+30+35+40+45=175$

Participant 1 will be ranked higher than Participant 2.

## Contest rules

1. Daily answer submission limit is 5 times.
2. Participating teams can use self-produced data or additional open source resources to improve model training results, but they must use machine learning/deep learning methods for identification . It is prohibited to use any manual correction on the identification results, but the impact of self-made data or open source resources on the model and its analysis can be discussed in the written report submitted at the end of the competition.
3. If you use additional self-made materials or external open source materials, generative AI tools, including but not limited to third-party open source programs on the Internet, or reference codes provided by instructors in class, you must comply with the Copyright Law of the Republic of China (Taiwan). Participating teams should provide relevant sources in the written report submitted at the end of the competition and explain the participants' contribution to the results of this competition based on external data. In case of dispute, the organizer reserves the right of final decision .
4. In order to ensure the fairness of the competition, the top 25% of the Private Leaderboard's total ranking; and the teams (no more than 30 teams) whose results exceed the baseline score set by the jury team must submit a final report after the competition, including (but not limited to): ( 1)

Members, (2) Model algorithm description, (3) Data preprocessing source code description, (4) Model training source code and description, (5) Parameter settings (including training weights) description, (6) Description of the program execution environment, (7) Whether additional resources are used and the sources are explained. The report will be reviewed by a review team composed of expert committee members from the Artificial Intelligence Competition and Annotation Data Collection Project Office of the Ministry of Education. The completeness and accuracy of the report will affect the award qualifications and rankings.

5. The results uploaded by participants are not allowed to be artificially modified to avoid affecting the fairness of the competition.
  6. Teams are not allowed to share programs and characteristic values privately, and post-game reports should be written independently. However, it can be discussed publicly in the official forum . This is not applicable to those that are referenced by other teams after public sharing and discussion .
  7. Teams should pay attention to the protection of data processing, model programs, and related ideas, and do not share or pass code, report drafts, and other information privately to other teams during the competition. If the reports and procedures submitted by different teams are similar, it will affect the evaluation results of all participating teams. In serious cases, the qualifications for winning will be directly disqualified.
  8. If necessary, the organizer reserves the right to adjust the data set during the competition.
  9. If the following circumstances occur, the organizer may disqualify the contestant or receive the prize without informing the contestant:
    - There is concrete evidence that the team has committed any plagiarism, cheating, or fraud.
    - There is concrete evidence that the team you belong to has infringed upon the intellectual property rights of others.
    - There is concrete evidence that the team they belong to has attacked the Leaderboard system.
    - There is concrete evidence that the team to which it belongs has influenced other participating teams, leading to unfair incidents.
    - There has been concrete evidence that the team has violated the rules of this competition, or the terms of use of the "T-Brain AI Combat Bar Platform Service", or the terms of use of the contestants of " Predicting power generation based on regional microclimate data "
  10. The organizer reserves the right to interpret and rule on event and competition rules.
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## Award Description

Award name	Quota	bonus
First place	1 team	NTD 60,000
Second place	1 team	NTD 40,000
Third place	1 team	NTD 30,000
Merit Award	2 team	NTD 20,000
The Honorable mention Award	8 team	NTD 10,000
Trend Micro AI Creativity Award	5 team	NTD 20,000

In addition to the cash prizes, the top 13 teams in the student group will also be awarded the " Ministry of Education Certificate ". Teams ranked 14th to 30th and in the top 25% , regardless of status, will be awarded the " Project Office Electronic Certificate " after submitting their reports in accordance with regulations and being reviewed by the organizer's review committee .

## Competition schedule

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<b>Registration schedule</b>	2024/9/2 – 2023/11/20	Open for registration
<b>Competition training set Training Dataset download</b>	2024/9/23 11:00 AM – 2024 /11/ 28	Competition teams can download the competition training set Training Dataset
<b>The game officially begins</b>  <b>Competition training set T raining Dataset update, competition test set Test Dataset download and training model prediction</b>	2024/11 / 18 11:00 AM – 2024/11 /28	<ul style="list-style-type: none"> <li>Supplementary information will be added to the Competition Training Dataset for competition teams to download.</li> <li>The test set includes Public Dataset and Private Dataset , and the final score of the competition award is calculated based on the Private Dataset results.</li> <li>11:00 am on 11/18, competition teams can download the competition test set, and the Leaderboard will be based on the upload result with the highest score . During this period, contestants can receive Test The scoring results of the Dataset are used as a reference. In the event of a tie, the ranking order will be determined based on the submission time, and the one who uploaded first will be ranked first.</li> <li>During this period, the maximum number of submissions of prediction results per day is 5 times, and the number of daily uploads is calculated by file.</li> <li>The answer upload deadline is 23:59:59 pm on November 28 , 2024. Uploads will not be accepted after the deadline.</li> <li>Contestants must upload files within the specified time, and answer files must follow the prescribed format to avoid upload failure.</li> </ul>
<b>Results released</b>	2024/ 12/2 11:00 AM	Announcement of Private Leaderboard results

<b>Upload report</b>	2024/12/2 – 2024/12/9	The winning team submits the description document of the prediction model , the self-made training data set, and the program code.
<b>Announcing the final ranking</b>	2024/1/7 16:00 AM	Announcing the final ranking of this competition
<b>Award Ceremony</b>	Early 2024 ( tentatively scheduled for the first season )	The award ceremony will be held together with the preliminary and advanced competitions, details will be announced separately

## Q&A

If you have any questions about the competition, you are welcome to ask them in the discussion area. **If it is not convenient to ask questions in the public discussion area, please fill in the questions to the AI CUP 2024 Autumn Competition - Power Generation Prediction Competition Based on Regional Microclimate Data Question Form ( <https://forms.gle/xBZEcbj4onRcHYAM9> ), or email to [t\\_brain@trendmicro.com](mailto:t_brain@trendmicro.com) .**

## circuit courses

The organizer will open AI CUP touring courses across the country. All courses are free to register. Interested participants are welcome to follow the latest news on the AI CUP website ( <https://moeaincu.wixsite.com/aicup> ) or follow the FB fan page ( <https://www.facebook.com/AICUPrealtask> ) .



Competition guidance unit: Information and Technology Education Department of the Ministry of Education



Competition planning unit: Artificial Intelligence Competition and Annotation Data Collection Project Office of the Ministry of Education



Topic provider: Department of Information Engineering, National Dong Hwa University



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Platform sponsor: Trend Micro