赛题介绍

“

这段文字的语法整体不错，但有几处可以改进以增加清晰性和流畅性。以下是建议的改动：

1.在介绍赛题的第二段中，建议将“举例来说，考虑一个标准的空气动力学数据集，其中包括具有达到五百万雷诺数的三维车辆几何形状。”改为“以一个包含多种三维车辆几何形状、雷诺数达到五百万的标准空气动力学数据集为例。”

2.在同一段中，“这对快速设计迭代构成了挑战。”可以更明确为“这对快速设计迭代过程构成了挑战。”

3.将“深度学习可以通过在模拟数据上训练，辨识设计参数（例如，形状、表面特征）与空气动力学阻力之间的关系。”修改为“通过在模拟数据上训练，深度学习能够识别设计参数（如形状、表面特征）与空气动力学阻力之间的关系。”

4.将“数据集介绍”段落中的“车辆速度固定为每秒20米，估计的雷诺数为O(10^56)范围内。”

5.在同一段落中，”下表显示了数据的解释。“可以改为”下表解释了数据内容。“

6.在“基于这套训练数据，我们鼓励选手采用不同的训练策略来达到不同的训练目标，因此我们使用不同的测试集（对应了不同的训练目标）将这套数据划分成了三个赛道：”这句中，去除重复的“不同”表述，改为“基于这套训练数据，我们鼓励选手采用多种训练策略以达到各自的目标。因此，我们根据不同的训练目标划分了三个赛道，每个赛道使用不同的测试集：”

这样修改后，文本更加流畅和易于理解。

”

竞赛机制

“

这段文字的整体表达较为清晰，但有一些小的语法和表达可以改进以增加专业性和清晰度。下面是修改后的版本：

注册和提交注册仅对团队开放，不针对个人。每个团队的成员数不得超过5人，且禁止重复注册。为了避免通过枚举测试数据的所有可能结果来提升成绩，每个团队每天只有3次提交CSV或ZIP文件的机会。此外，在最后期限前一周将发布一个新的测试集。所有团队必须在AtomGit代码库中提交完整且能在Colab上运行的Jupyter Notebook以供审查。如果需要加载模型和安装库，则应通过wget和pip命令进行下载。每个赛道排名前15的参赛者还需在7月14日之前提交一份不超过6页的英文技术报告，以便组委会确认最终排名。未提交技术报告者视为自动弃权。选手需将技术报告发送至wangguan12@baidu.com，并抄送至邮箱hliu2490@uni.sydney.edu.au。所有提交的解决方案默认同意开源。比赛允许使用外部数据，但该数据必须是公开可访问的。参赛者需在论坛上发布如何访问外部数据的详细信息，并提供Python示例代码。

时间线

4月23日：开放注册并发布初始数据。参与者将使用初始数据进行练习，以熟悉问题。

5月1日：发布完整数据。我们将发布所有数据集、软件包及基线代码。

5月21日：公榜开始提交。所有团队可以尝试演示提交，以确保最终测试提交的顺利进行。

7月7日：关闭注册通道和团队合并通道。私榜数据集将开放用于团队测试提交。

7月14日：最终提交截止日期。每个团队提交最终报告和测试预测，将在整个测试数据上进行评估。

7月21日：公布获胜团队。获胜团队将被邀请参加会议分享他们的工作！

所有时间均以“Anywhere on Earth”时间计。

这些修改使得表达更加规范和清晰。

”

竞赛支持

“

这段文字的信息很完整，但是有一些地方可以改进以使语句更加流畅和正式。以下是修改后的版本：

竞赛期间，百度公司的周原野博士和开放原子开源基金会的刘海旭将负责解答与赛题、赛程以及平台技术相关的问题。联系邮箱如下：

王冠：wangguan12@baidu.com

刘海旭：hliu2490@uni.sydney.edu.au

比赛的学术性与公平性将由百度公司、北京航天航空大学和开放原子开源基金会的专家组成的委员会监督。该委员会负责评定与审核比赛结果，并监督奖励的发放。联系邮箱如下：

马艳军：mayanjun02@baidu.com

周号益：haoyi@buaa.edu.cn

辛晓华：xinxiaohua@openatom.org

此外，以下人员对竞赛的顺利推进做出了杰出贡献：百度公司的飞桨团队成员周原野、张军、胡晓光、张艳博等共同参与了出题、数据仿真、baseline编写等工作；开放原子开源基金会的李明宇、张哲、郭顺德等参与了赛题平台的建设与维护以及赛题在全球范围内的推广工作。

这样的修改使得文本在结构上更清晰，语法更加规范。

”

奖项设置

“

这段文字的语法基本上是通顺的，但有一些细节可以稍作调整以提高清晰度和流畅性。以下是我修改后的版本：

奖金总额不少于35,000美元。各赛道的奖金设置如下：

第一名：5,000美元；

第二名：2,000美元；

第三名：1,000美元；

第四至第十名：每名500美元。

团队获得的奖金可以累计。前三名团队将获得获胜者证书，第四至第十名的团队将获得决赛选手证书。

在所有赛道中表现最佳的学生团队将额外获得一份证书和500美元的奖金！

除了金钱奖励之外的奖项包括：所有获奖团队成员将有机会直接获得开放原子开源基金会的面试推荐，无需笔试。

获得Winner的队伍将有机会以共同作者的身份在2025年的IJCAI会议上展示成果。

这样的调整使得信息更为明确，也更符合中文的表达习惯。

”

赛题公告

“

这段中文文字的语法基本上是正确的，不过可以稍微调整一下措辞，使其更加正式和清晰。下面是修改后的版本：

该板块用于更新赛题信息，并公开回复参赛者关于赛题和平台的疑问。

测试数据集将于5月1日之后提供下载。

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Introduction

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Aerodynamic drag significantly impacts vehicle performance and efficiency in both the automotive and aerospace industries. Traditionally, predicting aerodynamic drag has relied on time-consuming and computationally intensive simulations, which slow down design processes. Recent advances in deep learning, particularly in AI for Science, offer a new approach by learning directly from data.

For example, consider a standard aerodynamics dataset featuring 3D vehicle geometries with Reynolds numbers as high as five million. Traditional numerical methods require approximately () seconds to compute vehicle surface pressure, a critical parameter for calculating aerodynamic drag. In contrast, machine learning (ML) models can identify relationships between design parameters (e.g., shape, surface features) and aerodynamic drag by training on simulation data. Once trained, these models can predict aerodynamic drag for new designs in about seconds, significantly reducing computational resource demands.

The potential impact of this advancement extends beyond the automotive and aerospace sectors, influencing industries where aerodynamics is crucial, such as wind energy, architecture, and sports equipment development. The rapid and accurate prediction of aerodynamic drag offers transformative possibilities.

However, a key issue is the generalization capability of ML models. Typically, a trained ML model may struggle to make accurate predictions when faced with new vehicle geometries. To address this, we introduce the Rapid Aerodynamic Drag Prediction for Arbitrary 3D Vehicles challenge, which emphasizes the generalization capabilities of ML models. This aspect is often overlooked in most existing ML models and competitions, which do not adequately assess generalization across diverse datasets.

"

Dataset

"

We have generated an industry-level steady vehicle aerodynamics simulation dataset using the 3D ShapeNet Car (viewable in Paraview software). The fixed vehicle velocity is 20m/s, with an estimated Reynolds number between . Each data sample includes vehicle surface point coordinates, surface pressure, and the drag coefficient, as detailed in the table below.

We encourage participants to adopt various training strategies to achieve different training objectives. Consequently, we have divided this dataset into three tracks, each with a different test set corresponding to distinct training objectives:

Track A: The test data includes 50 different ShapeNet Car datasets.

Track B: The test data features 50 anonymous car datasets not from the ShapeNet Car dataset. These cars, more realistic and akin to road cars like Audi and Volkswagen, may have slight speed variations compared to the training set.

Track C: The test data comprises both the 50 ShapeNet Cars and the 50 anonymous cars.

Use of the competition data requires permission from Baidu, Inc.

Competition Support

"

Download Link

The training dataset can be downloaded here:

https://aistudio.baidu.com/datasetdetail/268501

The link for downloading the test set will be available after May 1.

Additionally, Baidu will provide a baseline solution using the PaddlePaddle framework, with the link available after May 1.

"

Evaluation

"

This challenge focuses on the rapid prediction of aerodynamic drag for arbitrary 3D vehicles. Teams will be ranked based on their final weighted scores to determine the winner in each track. The main evaluation metrics will be the average Root Mean Square Error (RMSE) and the Mean Absolute Error (MAE) of the predicted surface pressure on the test data. Additional considerations include efficiency metrics and memory consumption costs to ensure that the model can be deployed as an online service. Teams must also submit a technical report, not exceeding six pages, that describes the implementation and performance of their model, as well as its interpretability. The final score combines the model’s RMSE and MAE scores with the committee’s evaluation weighted score as follows:

Final Score = 0.04 / RMSE + 0.04 / MAE + 0.2 × Committee Evaluation Weighted Score

Track A: The final score is evaluated using 60% of the data from the ShapeNet Cars dataset, which consists of 50 models.

Track B: The final score is evaluated using 60% of the data from a dataset of 50 anonymous cars simulations.

Track C: The final score is evaluated using 60% of the data from both the ShapeNet Cars and the anonymous cars datasets.

"

Award

"

The total prize amount is no less than $35,000. The prize distribution for each track is as follows:

1st Place: $5,000

2nd Place: $2,000

3rd Place: $1,000

4th to 10th Place: $500 each

The bonuses earned by the teams are cumulative. The top three teams will receive a winner's certificate, while the fourth to tenth teams will receive a finalist certificate.

The student team with the best performance across all tracks will receive an additional certificate and a $500 prize.

Beyond the monetary awards, all members of the prize-winning teams will have the opportunity for a direct interview recommendation for job opportunities at the OpenAtom Foundation, without a written test.

The winning team will also have the opportunity to present their results as co-authors at the IJCAI Conference in 2025.

"

Leaderboard

"

The three tracks of this competition will each have independent leaderboards, divided into public (40% of the dataset) and private (60% of the dataset) categories. The public leaderboard requires the submission of a zip file containing the predicted results, while the private leaderboard requires a complete and runnable Jupyter Notebook in the Colab environment. The links to the leaderboards for each track are as follows:

Track A: https://rank-competition.atomgit.com/track1/

Track B: https://rank-competition.atomgit.com/track2/

Track C: https://rank-competition.atomgit.com/track3/

Additionally, to encourage participants to use the PaddlePaddle framework, Baidu has provided a separate leaderboard specifically for solutions built with PaddlePaddle. This leaderboard will use the training set as test data to help participants verify the operability of their code. It will be available after May 1st.

"

Information Release

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This section is dedicated to updating competition information and publicly responding to participants' questions regarding the competition and platform.

April 24: Team registration has begun. The test dataset will be available for download starting May 1.

"