BenchCouncil International AI System and Algorithm Challenges

International Open Benchmark Council (BenchCouncil)
http://www.benchcouncil.org

For any questions, Please access the BenchCouncil discussion groups hosted on Xinxiu---a dedicated communication tool for science and education.

https://app.ic3i.com/org/benchcouncil/en/
# Table of Contents

About BenchCouncil .................................................................................................................. 3

1 Challenge Overview .................................................................................................................. 4

2 2019 Challenges ...................................................................................................................... 4

3 Awards and Rules ..................................................................................................................... 5

4 Communication Tool .............................................................................................................. 6

5 Important Dates and Procedure ............................................................................................... 6

6 Challenge Tracks ..................................................................................................................... 7

7 Experiment Platform ................................................................................................................ 11

8 Code Management System ..................................................................................................... 12

9 BenchCouncil Conference and Result Submission ................................................................. 12

Appendix Frequently Asked Questions .................................................................................... 13
About BenchCouncil

International Open Benchmark Council (BenchCouncil) is a non-profit research institute, which aims to promote the standardization, benchmarking, evaluation, incubation, and promotion of open-source chip, AI, and Big Data techniques.

The current BenchCouncil activities include:

- Establish and maintain a repository of benchmark specifications for quantitative system and algorithm evaluation and analysis.
- Review, shepherd, and release open-source benchmark implementations.
- Set up testbeds for innovative open-source chip, AI, and Big Data techniques.
- Organize conferences, workshops, and teleconferences fostering the transfer of knowledge between industry and academia in the areas of benchmarking.
- Organize challenges using released benchmarks.

BenchCouncil organizes BenchCouncil main conference (Bench), BenchCouncil International Symposium on Intelligent Computers, and BenchCouncil International Symposium on Chips (Chips 2019).

BenchCouncil Executive Committee

Prof. D. K. Panda, IEEE Fellow
the Ohio State University

Prof. Lizy Kurlan John, IEEE Fellow
the University of Texas

Prof. Geoffrey Fox, IEEE & ACM Fellow
Indiana University

Mr. Hainan Ye
Beijing Academy of Frontier Sciences and Technology

Vijay Janapa Reddi
Harvard University

Prof. Jianfeng Zhan
ICT, Chinese Academy of Sciences, University of Chinese Academy of Sciences (Chair)
1 Challenge Overview

BenchCouncil organizes a series of International AI challenges, aiming to (1) advance the state-of-the-art or state-of-the-practice algorithms on different systems or architectures, (2) solicit new approaches to advance the state-of-the-art or state-of-the-practice algorithms. The challenges are organized every year. The topics for all challenge tracks are derived from an industry standard AI benchmark suite AIBench (http://www.benchcouncil.org/AIBench/index.html). BenchCouncil provides (1) the testbed for reproducing performance numbers, including RISC-V simulators, Cambrian chips, X86 processors, GPU, and other processors or accelerators, (2) code management system--BenchHub, (3) communication tool---Xinxiu---we will share and update information in the discussion groups hosted on Xinxiu. The web link is https://app.ic3i.com/org/benchcouncil/en/. (4) Presentation session---on BenchCouncil International Symposium on Benchmarking, Measuring and Optimizing (Bench 19, Nov 14-16, 2019 @ Denver, Colorado, USA, the same place, priori to SC 19).

Every year, any companies and research institutes can sponsor a challenge track before the deadline (August 1st). The sponsor could provide financial support and donate hardware or software.

2 2019 Challenges

2019 BenchCouncil International AI System and algorithm Challenges includes four tracks, consisting of system challenges on Cambrian---an AI accelerator, X86, RISC-V and an algorithm challenge sponsored by Intellifusion.

Challenge homepages:
2019 BenchCouncil International Artificial Intelligence System Challenges is organized by BenchCouncil joint with Cambrian, China RISC-V alliance, Sugon, and Intellifusion.

RISC-V is an open-source instruction set architecture based on RISC principles. As an outstanding representative of open source chip technology in recent years, RISC-V has attracted extensive attention in various fields worldwide.

Cambrian is the forerunner of global intelligent chip area. The "Cambrian 1A" processor, which is proposed at 2016, is the first terminal specific processor for AI in the world, and has been widely used in smart phones.

Shenzhen Intellifusion Technologies Co. Ltd. is an AI (artificial intelligence) unicorn company equipped with AI algorithm, AI chip and big data concurrently for the first time in China.

3 Awards and Rules

The total awards of 2019 BenchCouncil International AI Challenges are 500,000 CNY, which is about **70K US Dollar**.

- Special Award (Only one): 100,000 CNY
- The First Prize for Every Challenge Track: 30,000 CNY
- The Second Prize for Every Challenge Track: 20,000 CNY
- The Third Prize for Every Challenge Track: 10,000 CNY

**The rules of 2019 challenges are:**

(1) Each person can only join one team.
(2) Each team consists of one to three members and may choose one mentor. Each winning team needs to register and attend Bench 19 (http://www.benchcouncil.org/bench19/index.html), submit a paper (published by Springer LNCS), and give a presentation.

(3) Every track will select seven challenge team as award candidates. The award candidates should submit conference paper to Bench 19 (EI-indexed), register the conference and give a presentation.

(5) The results of the challenges will be finalized before Oct 1st. The results are evaluated by the overall scores of two parts: the performance numbers finalized before the deadline (70%), and expert’s ratings (30%). The performance data can be further optimized after the deadline, while the performance data finalized before Oct 1st should be highlighted. The special award will select from the first prize of four tracks.

4 Communication Tool

The discussions groups are hosted on Xinxiu---a dedicated communication tool for science and education.

The Web version of Xinxiu to get the latest news about BenchCouncil:

https://app.ic3i.com/org/benchcouncil/en/

5 Important Dates and Procedure

2019.09.18: Registration deadline

2019.10.01: performance data finalized. Please submit the code to BenchHub for artifact evaluation.

2019.10.15: preliminary paper version is submitted.

Paper submission:
2019.11.10: Camera-ready version is submitted.

2019.11.14-16: Bench 19 Conference

Bench19 Website:  http://www.benchcouncil.org/bench19/index.html

Bench19 Registration:  https://eur.cvent.me/0QG1

Procedure:

(1) Register and login in
(2) Create team, choose teammate and tracks
(3) Apply for the node
(4) Implement and test on applied node
(5) Submit before Oct. 1st, including code, description file, running script, and test results.
(6) An invitation letter is sent to award candidates for attending Bench 19 conference (Nov. 14-16, Denver, US, three days prior to SC 19).
(7) Bench 19 submission deadline: Oct 15, 2019. Note that the award candidates should submit paper and give a presentation on Bench 19 (Online presentation is allowed in particular cases, such as Visa issues).

6 Challenge Tracks

2019 BenchCouncil International AI System and algorithm Challenges consists of four tracks. The topics are select from BenchCouncil Industry
Standard Internet Service AI Benchmark Suite---AIBench. It consists of one end-to-end business AI benchmark---E-commerce Search, 16 prominent AI problem domains and 16 component benchmarks: classification, image generation, text-to-text translation, image-to-text, image-to-image, speech-to-text, face embedding, 3D face recognition, object detection, video prediction, image compression, recommendation, 3D object reconstruction, text summarization, spatial transformer, and learning to rank, and 12 micro benchmarks.

**AIBench Homepage:**
http://www.benchcouncil.org/AIBench/index.html

**AIBench Download:**

Micro Benchmarks:

Component Benchmarks:

Application Benchmarks:
http://125.39.136.212:8090/AIBench/AIBench_DCMIX

**AIBench Publications:**


• **Track 1: International AI System Challenge based on RISC-V**

**Subject:**
The implementation and optimization of convolutional neural network based image classification task on RISC-V.

**Requirements:**
(1) Implement the forward Calculation of neural network. Load and run the given trained model ResNet-20, the format of model is hdf5.

Download simulator: [https://hub.docker.com/r/crva/riscv-qemu](https://hub.docker.com/r/crva/riscv-qemu)

Download data: [https://www.cs.toronto.edu/~kriz/cifar-10-binary.tar.gz](https://www.cs.toronto.edu/~kriz/cifar-10-binary.tar.gz)


(2) Minimize external dependences, and try not to use external libraries (e.g., OpenMP, Pthread, Boost).

(3) Use the model required by the organizer and guarantee the original model accuracy. The accuracy deviation with the result of organizer provided model is within 0.05%.

**Metrics:**
(1) Minimize the binary file (e.g., the executable files compiled by RISC-V compiler, model weights, etc).

(2) Maximize the execution performance and minimize the number of instructions.

• **Track 2: International AI System Challenge based on Cambrian Chip**

**Subject:**
Implement the image classification program on Cambrian chip using CIFAR-10 dataset.

**Requirement:**
（1）Implement the forward Calculation of neural network. Load and run the given trained model ResNet-50
Download data:
https://www.cs.toronto.edu/~kriz/cifar-10-binary.tar.gz
Download model (trained using AIBench image classification benchmark):
（2）Use the model required by the organizer and guarantee the original model accuracy. The accuracy deviation with the result of organizer provided model is within 0.05%.

Metric:
（1）Maximize the execution performance and minimize the prediction time (wall clock time) on provided test data.

- **Track 3**: International AI System Challenge based on X86 Platform
  Subject:
The implementation and optimization of matrix decomposition based collaborative filtering task on X86 platform.
  Requirements:
  （1）Implement ALS-WR [1] training algorithm on X86 platform. The competitors can use external libraries supported by the platform.
  Download data: https://grouplens.org/datasets/movielens/
  （2）The parameter nf chooses 100. Training 30 rounds using Movielens dataset, shorter training time is better.
  Metric:
  （1）Maximize the execution performance and minimize the training time (wall clock time) on provided data.

- **Track 4**: International 3D Face Recognition Algorithm Challenge
  Subject:
  3DFRC (3D Face Recognition Challenge) aims at soliciting new approaches to advance the state-of-the-art in face recognition.
  Requirements:
（1）The competitors are optional to use external data for model training.
（2）The external data used for training must be described in "method description" file.
（3）The competitors need to submit the model file and test file
（4）Source code for test and description document should be submitted. The source code for test need to implement related interfaces using python3 and c++ (interfaces are specified in api.py/api.h). The description document need to describe how to test.

**Metric:**
（1）ROC and AUC

7 **Experiment Platform**

BenchCouncil Testbed---Tai---is the world's first open artificial intelligence testbed, aiming to provide platforms for verification and demonstration of new technology, and provide tools for training education and communication.

Testbed not only provides multiple mainstream evaluation environment, but also supports the environment generation within several seconds and supports specified cluster environment according to evaluation requirements. The testbed gathers various the state-of-the-art or state-of-the-practice hardware environment, including multiple GPUs and CPUs with different versions, Cambrian, RISC-V.

2019 BenchCouncil International Artificial Intelligence System Challenges use “Tai” as experiment platforms.


Testbed Login in:  [http://www.benchcouncil.org/testbed/t_login.html](http://www.benchcouncil.org/testbed/t_login.html)

（Note: Xinxiu account and AI challenge account can also login in）

**Applying procedure:**
（1）Register of login in Testbed
（2）Apply for the nodes according to teams, do not apply repeatedly
（3）Wait for the verification
（4）Access to the node using IP address and port through ssh
（5）Node recovery after finished

8 Code Management System

BenchCouncil BenchHub is a code management system which can be used to host source code and manage projects. All the source codes of BenchCouncil benchmarks and challenges are published on BenchHub. In addition, everyone can register an account and use BenchHub to manage their own codes.

BenchHub Link: http://125.39.136.212:8090/

How to use BenchHub:

Source code upload:
Step 1. Install git and create a BenchHub account
Step 2. Initialize a git repository: git init
Step 3. Add file to repository: git add "file"
Step 4. Commit to repository: git commit
Step 5. Create a new repository on BenchHub, e.g., http://125.39.136.212:8090/Example/example.git
Step 6. Associate local repository to BenchHub: git remote add origin http://125.39.136.212:8090/Example/example.git
Step 7. Push to BenchHub: git push -u origin master

9 BenchCouncil Conference and Result Submission

Bench 19 provides a high-quality, single-track forum for presenting results and discussing ideas that further the knowledge and
understanding of the benchmark community as a whole. Bench 19 has
two special events: the AI benchmarking reports and AI system and
algorithm challenges. Also, we will invite speakers from China, US,
Europe and Japan on HPC AI topics.

BenchCouncil Bench 19 will be held in Denver, Colorado, USA. The
main theme of Bench 19 is benchmarking, measuring, and optimizing
Big Data or AI in HPC, Datacenter, IoT, and Edge Computing.

Bench19 website:  http://www.benchcouncil.org/bench19/index.html
Bench19 registration:  https://eur.cvent.me/0QG1
Bench19 paper submission:
https://easychair.org/conferences/?conf=competition2019

**Appendix** Frequently Asked Questions

(1) How to obtain the latest information
Download Xinxiu APP or visit Xinxiu web version, and join the “AI Challenges
Group”.

(2) How to have access to the applied node
ssh + ip address + port number

(3) How to submit code and when
The submission link:  http://125.39.136.212:8090,  deadline is Oct 1st.

(4) Does the node has qemu simulator and how to obtain the trained model
The website provides the simulator, please download it and use it.
QEMU Simulator:  https://hub.docker.com/r/crva/riscv-qemu
RestNet-20 Model
http://www.benchcouncil.org/competition/cifar_resnet.zip

(5) Does Cambrian provide the trained model
（6）For x86 challenge of recommendation task,
what is the ratio of training data to testing data for movielens data set?

The ratio is 80/100 for training, and 20/100 for test. The data uses ml-20m data.