

PaddlePaddle

Open-source Deep Learning Platform from Industrial Practice

[paddlepaddle.org.cn](http://paddlepaddle.org.cn)





The data in this brochure are internal or provided by the partners' tests. The actual results may vary within a certain range depending on the test environments. They are used for reference only.



# 01

## PaddlePaddle

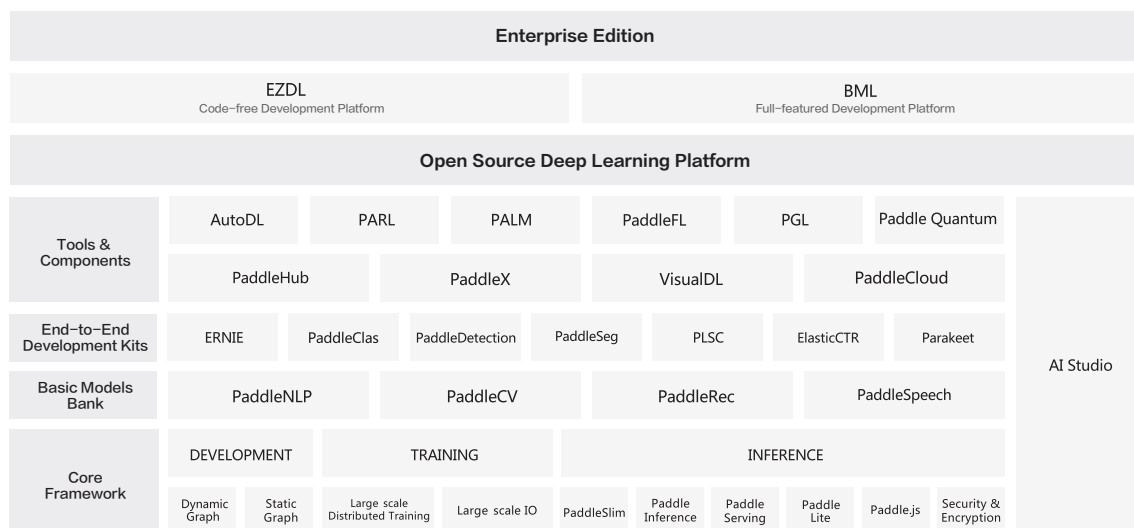
PaddlePaddle, on top of Baidu's efforts on research, development and commercialization of deep learning technologies, has been officially open-sourced to professional communities since 2016, as an industrial deep learning platform with advanced technologies and rich features that cover core deep learning frameworks, basic model libraries, end-to-end development kits, tool & component as well as service platforms. PaddlePaddle is originated from industrial practices with dedication and commitments to industrialization. It has been widely adopted by a wide range of sectors including manufacturing, agriculture, enterprise service and so on while serving more than 1.9 million developers. With such advantages, PaddlePaddle has helped an increasing number of partners commercialize AI.

**LEADING FRAMEWORK:** An easy-to-use, efficient/effective and secure deep learning framework meets all your demands for modeling, training and deployment of deep neural networks.

**END-TO-END DEVELOPMENT KITS:** Full-stack development kits, including ERNIE, PaddleSeg, PaddleDetection ElasticCTR and etc., facilitate the design and implementation of industrial applications.

**FEATURE-RICH TOOLS & COMPONENTS:** Deep learning tools and components, together with AutoDL, PaddleHub, PARL, PALM, PaddleFL, PGL, EDL, VisualDL and etc., offer more features than you may expect.

**PROFESSIONAL SERVICE PLATFORMS:** AI Studio, EZDL and EasyEdge — three professional service platforms carry out all requests from developers.



# 02

## FOUR LEADING TECHNOLOGIES BROUGHT BY PADDLEPADDLE

### 1.

#### Agile Framework for Industrial Development of Deep Neural Networks

The PaddlePaddle deep learning framework facilitates the development while lowering the technical burden, through leveraging a programmable scheme to architect the neural networks. It supports both declarative programming and imperative programming with both development flexibility and high runtime performance preserved. The neural architectures could be automatically designed by algorithms with better performance than the ones designed by human experts.

### 2.

#### Support Ultra-Large-Scale Training of Deep Neural Networks.

PaddlePaddle has made breakthroughs in ultra-large-scale deep neural networks training. It launched the world's first large-scale open source training platform that supports the deep networks training with 100 billions of features and trillions of parameters using data sources distributed over hundreds of nodes. PaddlePaddle overcomes the online deep learning challenges for ultra-large-scale deep learning models, and further achieved the real-time model updating with more than 1 trillion parameters.

### 3.

#### Accelerated High-Performance Inference over Ubiquitous Deployments

PaddlePaddle is not only compatible with other open-source frameworks for models training, but also works well on the ubiquitous deployments, varying from platforms to devices. More specific, PaddlePaddle accelerates the inference procedure with fastest speed-up. Note that, a recent breakthrough of inference speed has been made by PaddlePaddle on Huawei's Kirin NPU, through the hardware/software co-optimization.

### 4.

#### Industry-Oriented Models and Libraries with Open Source Repositories

PaddlePaddle includes and maintains more than 100 mainstream models that have been practiced and polished for a long time in industry. Some of these models have won major prizes from key international competitions. In the meanwhile, PaddlePaddle has further more than 200 pre-training models (some of them with source codes) to facilitate the rapid development of industrial applications.

# 03

## END-TO-END DEVELOPMENT KITS

### Semantic Understanding of ERNIE

ERNIE development kit leverages Baidu ERNIE 2.0—the most up-to-date enhanced representation learning system for natural language Processing through knowledge integration. It provides novel transfer learning features that can fine-tune the ERNIE pre-trained models to adapt the target training dataset. Moreover, the Fast-Inference APIs are also provided to accelerate the inference procedure of such heavily-weighted models. In addition, it also offers a series of tool sets such as ERNIE Service for flexible deployment and the ERNIE Tiny for lightweighted developments.

<https://github.com/PaddlePaddle/ERNIE>

### PaddleSeg Image Segmentation

PaddleSeg is an image segmentation library for industrial uses. It covers the four mainstream segmentation models, i.e., DeepLabv3+, PSPNet, U-Net and ICNet. Through a unified set of configuration, one can complete the fully featured image segmentation tasks from training to deployment with less efforts. PaddleSeg is capable of feature-rich data augmentation, high performance training and inference with almost full coverage of mainstream models and industrial deployment supports.

<https://github.com/PaddlePaddle/PaddleSeg>

### PaddleDetection Object Detection

PaddleDetection is an object detection library designed to provide several easy-to-use object detection models for industry and academics. PaddleDetection supports high performance training with accelerated inference, provides rich pre-trained models, and facilitates industrial deployment.

<https://github.com/PaddlePaddle/PaddleDetection>

### ElasticCTR Personalized Recommendation

ElasticCTR enables automatic distributed training of CTR prediction tasks with one-click deployment to the serving procedure. It provides end-to-end CTR training with programmable interfaces that allow further extension to customized solutions. ElasticCTR is born for industrial practices, with flexible task scheduling capability, high performance, and industrial deployment supports.

[https://paddlepaddle.github.io/Serving/doc/ELASTIC\\_CTR.html](https://paddlepaddle.github.io/Serving/doc/ELASTIC_CTR.html)

# 04

## RICH TOOLS & COMPONENTS

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### PaddleHub

#### PRE-TRAINED MODEL MANAGEMENT AND TRANSFER LEARNING COMPONENTS

Transfer Learning Via 10 Lines of Codes

It provides over 40 pre-trained models, covering eight categories of models designed for Natural Language Processing and Computer Vision. There needs only one line of code or a simple command line to pop-up PaddleHub pre-trained models for inference tasks. A fully-featured transfer learning program can be completed within 10 lines of codes and PaddleHub APIs.

<https://github.com/PaddlePaddle/PaddleHub>

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### PARL

#### PADDLEPADDLE-BASED DEEP REINFORCEMENT LEARNING FRAMEWORK

The Consecutive Winner of NeurIPS 2018-2019 Reinforcement Learning Competitions

With high flexibility, scalability, and extensibility, PARL supports customizable parallel training of mainstream reinforcement learning algorithms, such as DQN, DDPG, PPO, IMPALA, A2C and GA3C. With 8 GPUs, PARL carries 20000 CPU nodes to accelerate the PPO algorithm by almost 300x speed-up. For example, PARL only consumes 1 minute per PPO iteration while the original implementation needs 5 hours.

<https://github.com/PaddlePaddle/PARL>

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### AutoDL

#### AUTOMATED DEEP LEARNING

Its network design partially has better effects than the design of human experts.

AutoDL includes three parts: AutoDL Design—automated neural network design, AutoDL Transfer—the automated deep transfer learning to adapt small training datasets and AutoDL Edge—edge-mediated deployment and adaption to ubiquitous devices. Last year, AutoDL open-sourced a novel architecture that achieves 98% top-1 accuracy for CIFAR10 image classification through training from scratch. The accuracy is higher than foreknown architectures designed by human experts, while AutoDL obviously takes the leadership in such area of industry.

### PALM

#### PALM Multi-task Learning

PALM (PAddLE Multitask) is a flexible and easy-to-use multi-task learning framework with rich built-in models and dataset loading & processing tools. For the vanilla multi-task learning scenarios, one could implement the program with minimal coding efforts. PALM also remains programmable interfaces to support further customization.

<https://github.com/PaddlePaddle/PALM>

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### PGL

#### NEURAL NETWORK OF PGL GRAPH

PGL (Paddle Graph Learning) is an efficient and easy-to-use graph learning framework. PGL offers a comprehensive set of programmable interfaces for storing/loading/querying graphical data structures, and provides the computational interface of two computational paradigms, i.e., Walk based and Message Passing based. With these interfaces, one can easily build cutting-edge graph learning algorithms. Together with the PaddlePaddle's core framework, PGL facilitates the development of graph network applications, including graph representation learning and graph neural networks, with less efforts.

<https://github.com/PaddlePaddle/PARL>

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### PaddleFL

#### PADDLEFL FEDERAL LEARNING

PaddleFL (Federated Deep Learning) is an open source federated learning framework. Researchers can easily reproduce and benchmark various federated learning algorithms using PaddleFL. In addition, it provides several federal learning strategies with supports to in computer vision, natural language processing, and recommender systems, etc.

Data source: Internal test results, which should be used for reference only because the actual test results may fluctuate due to different test environments. The 10 categories of networks come from public academic papers.

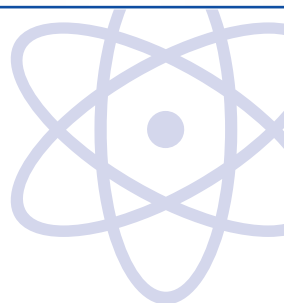
## COMMUNITY FOR AI LEARNING AND PRACTICE

### AI Studio

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AI Studio, a community for AI learning and practice with powerful development tools and plenty of datasets, open-source algorithms. It also provides high-bonus competitions and popular courses for users on different levels. Meanwhile, AI Studio facilitates AI education and helps enterprises speed up their business.

To learn more, visit: [aistudio.baidu.com](https://aistudio.baidu.com)





# 06

## MULT-SCENARIO APPLICATION CASES

### CASE 1: AI PEST IDENTIFICATION - DENDROCTONUS VALENS LECONTE MONITORING SYSTEM

#### PADDLEPADDLE HELPS THE IMPLEMENTATION OF FORESTRY PEST MONITORING

##### PROJECT BACKGROUND:

Dendroctonus-valens-LeConte is a kind of stem-boring pest that endangers more than 35 species of Pinaceae plants. From the first discovery in 1998 to 2004, the hazard area has exceeded 527,000 square kilometers, and more than 6 million dead pine trees have been found. In addition, the area continues to spread, bringing huge losses to China's forestry economy. AI pest identification is a smart pest occurrence quantity monitoring system with pheromone traps jointly developed by Beijing Forestry University, Baidu, Canaan and ISS Tech.

Data source: Plant Quarantine, May 2006 Issue

##### APPLICATION SCHEME:

The detection model YOLOv3 is trained using PaddlePaddle. It can automatically identify the Dendroctonus-valens-LeConte, making the remote detection of pest attacks possible.

##### HARDWARE DEPLOYMENT SOLUTION:

It is deployed on the Paddle Pi-K210 that can run YOLOv3 up to 30 FPS locally. The Paddle Pi-K210 is with a smaller size (38\*38mm), lower power consumption (1.2W working power) which costs a few hundred RMB only.

##### PEST IDENTIFICATION DEVICE:

With built-in power supply, available for year-long in the wild; industrial packaging, effective sealing against dust and water, waterproof grade of IP65; fast and safe local computing without Internet connection.

##### APPLICATION EFFECT:

Hourly data feedback and detection greatly improve the detection efficiency; Note that the traditional method needs workers to traverse the forest/farm once a week for monitoring.

#### APPLICATION SCHEME



#### MODEL EFFECT

##### YOLOv3

Object detection model

**90%**

Identification accuracy reaches 90% which is close to the professionals

**1 week vs 1 hour**

Greatly improve work efficiency  
Manual detection takes about a week



# CASE 2: STANDARD GOLF COURSE DETECTION

## PADDLEPADDLE HELPS THE MONITORING AND GOVERNANCE OF LAND RESOURCES

### PROJECT BACKGROUND:

With the rising of golf sport in China, there are increasing disputes about large amount of land resources occupancy, environment pollution, high water consumption and poor public welfare of golf courses. Since 2004, the state has formulated a series of relevant policies to control over-investment in golf courses. In 2017, the results of golf course cleaning and remediation jointly announced by the national ministries and commissions indicate that there are 683 golf courses in China. The monitoring of land use for golf courses is of great significance for discovering new golf courses and verifying the effects of cleaning and remediation. The Research Institute of Remote Sensing and Digital Earth of the Chinese Academy of Sciences assists the state to detect the expansion and change of major engineering land and effectively controls land resources.

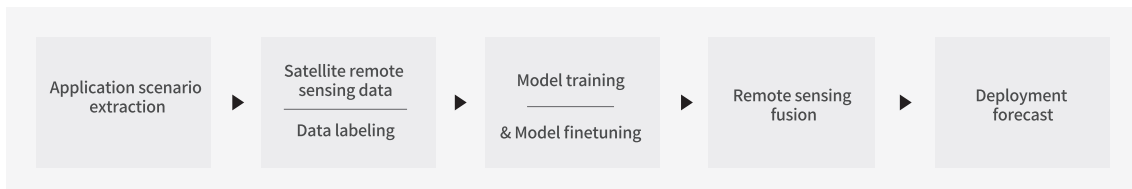
### APPLICATION SCHEME:

We implemented the detection of golf courses through PaddlePaddle Faster R-CNN model which has been integrated with the feature extraction network VGG16 and the Region Proposal Network (RPN).

### APPLICATION EFFECT:

We built up an image dataset to include over 800 golf course samples (collected in various time) and over 400 scene images, all from satellite remote sensing data sources. PaddlePaddle learns a model that can identify golf courses from satellite remote sensing images accurately and efficiently, while enjoying 90x speedup compared to the traditional method.

### APPLICATION SCHEME



### MODEL EFFECT

**Faster  
R-CNN**

Object detection

**84%**

Detection accuracy

**10s**

Work efficiency improved considerably

Manual identification needs 15 minutes



# CASE 3: LEADING VIDEO UNDERSTANDING TECHNOLOGY USED BY BAIDU'S CORE BUSINESSES

## PADDLEPADDLE RELEASES THE INDUSTRY'S LEADING VIDEO CLASSIFICATION TOOL KIT

### PROJECT BACKGROUND:

Since more and more people are watching short videos on the Internet, how to analyze, process and categorize massive videos, fast and accurately, becomes increasingly important. In this way, PaddlePaddle provides a multi-dimensional video understanding technology, which is able to understand the video semantic information and automatically label the video with diverse tags. In this way, PaddlePaddle can help people significantly improve efficiency of video annotation and reduce cost, while providing accurate recommendation results.

### APPLICATION SCHEME:

PaddlePaddle framework takes a two-stage training procedure to train models (2D/3D-CNN models, sequential models, etc.) for automatic video classification, tagging and representing videos as semantic vectors.

### APPLICATION EFFECT:

All videos streamed through Baidu Feed Video are categorized by the above models trained by PaddlePaddle to minimize the cost of video tagging.





# CASE 4: BAIDU CORE BUSINESS VERIFICATION RECOMMENDED SOLUTION

PADDLEPADDLE PROVIDES DISTRIBUTED TRAINING AND PREDICTIVE SUPPORT FOR TENS OF BILLIONS OF DATA-SCALE RECOMMENDATION SERVICES

## PROJECT BACKGROUND:

Personalized recommendation techniques have been widely requested in the market, where the CTR prediction plays a critical role. The way of handling massive click-through data with explosive growth and iterating the model training to adapt real-time updates has become the key to succeed in building a recommender system.

## APPLICATION SCHEME:

With a cost-effective training method based on multiple workers and a CPU parameter server, PaddlePaddle can ensure the online deep learning “on-the-fly” with high-frequency model updates/iterations while handling ultra-large-scale samples and features that are explosively growing with global-scale click-through traffics in high-throughput recommender systems.

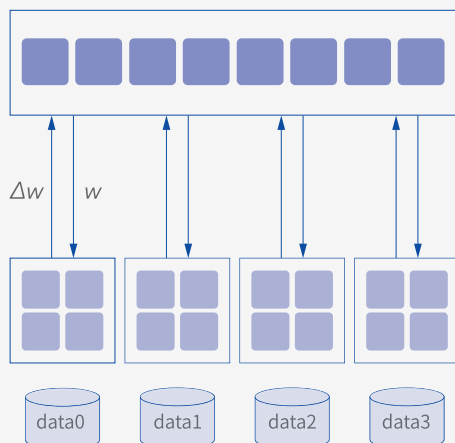
## APPLIED PRODUCTS:

Baidu Search, Haokan Video, Baidu Map, Baidu Translation

## APPLICATION EFFECT:

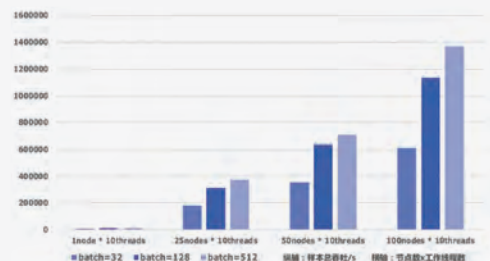
We validated the performance of PaddlePaddle, with 100 nodes\*10 threads using the realistic recommender systems. PaddlePaddle achieves decent real-time performance with a throughput of 0.6~1.4 million samples per second and can process 2~5 billion sample data per hour. In the case of a batch size of 512, the speedup ratio is up to 90%.

## APPLICATION SCHEME

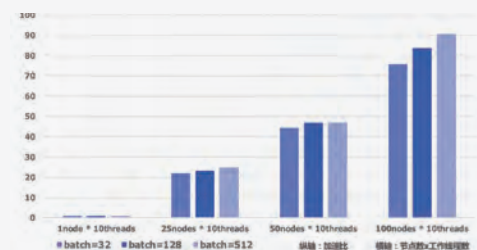


The way to synchronize task parameters like CTR estimation and semantic matching with large data throughput: asynchronous large-scale sparse parameter server

## APPLICATION EFFECT



Comparison of unit time throughput of personalized CTR estimation tasks under different concurrent resources



Speedup ratio comparison of personalized CTR estimation tasks under different batches

# CASE 5: DU XIAOMAN'S MODELING FOR FINANCIAL RISK CONTROL

## APPLICATION OF ERNIE (A KNOWLEDGE-ENHANCED SEMANTIC COMPREHENSION FRAMEWORK) IN FINANCIAL FIELD

### PROJECT BACKGROUND:

With rapid development of FinTechs, trillions of transactions for loans and repayments are proceeded on platforms every day. While the traditional manual transaction processing systems rely on highly-skilled financial professionals, the efficiency and auditing consistency cannot be guaranteed. It is difficult to use the traditional supervised learning method to model risk control problems with a small of labeled samples. When handling textual samples, traditional techniques often fail to adequately understand the context and cannot extract the key points, leading to wrong understanding to user needs.

### APPLICATION SCHEME:

ERNIE, an enhanced representation learning framework for NLP based on knowledge integration, was independently developed by Baidu. To fully use the ultra-large-scale language resources collected by Baidu, ERNIE incorporates the data management and distributed deep learning capacities provided by PaddlePaddle to take advantages from massive GPUs and big data through multi-task deep continual learning. The use of ERNIE can significantly improve the performance of all NLP tasks. Recently, Baidu has released the ERNIE 2.0 with the update-to-date pre-trained model. The model has been trained using 1 billion pieces of language resources and tops 16 Chinese and English NLP benchmarks.

In Du Xiaoman's risk control scenario, ERNIE is used to model the transactional information at semantic levels. With a small number of training samples, ERNIE fine-tunes the risk control model in a shorter period of time, while enjoying better generalization capabilities.

### APPLICATION EFFECT:

Du Xiaoman's financial risk control model KS improved by about 6.35% relatively, AUC 1.55%+, user sorting optimization about 21.5%



# CASE 6: METER READINGS - POWER GRID SMART PATROL INSPECTION SOLUTIONS

## PADDLEPADDLE BOOSTS THE UNMANNED PATROL INSPECTION PROCESS IN THE POWER ENERGY INDUSTRY

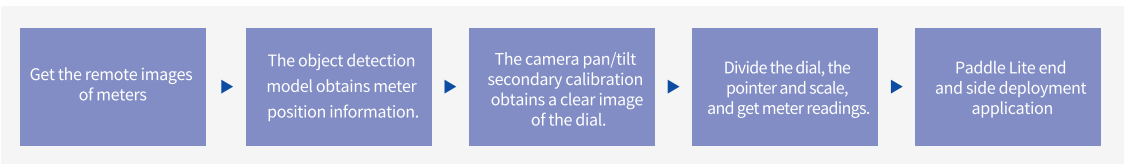
### PROJECT BACKGROUND:

Power transmission and distribution is an critical part of the power transmission through the electrical grid. Once a failure occurs, it would affect the daily electric utility supply to thousands of households. All along, the power patrol inspections have been completed and the power transmission and transformation equipment has been operated and maintained manually to ensure their normal operation. A typical transformer substation patrol inspection involves more than 1,000 patrol inspection points. It usually takes 6-7 working hours for two staff members to complete the inspection, consuming more manpower and time.

Guangdong Power Grid Corporation cooperates with Baidu PaddlePaddle to apply the visual capability of PaddlePaddle, and enables the intelligent inspection robot to carry out outdoor inspections with PaddlePaddle mobile-end inference engine. A staff member only needs to perform the patrol inspection task in the remote control room with one button, so that the robot can automatically carry out the detection with all relevant meters and readings back transmission along the planned route.

### APPLICATION SCHEME:

Based on Yolo V3 model in the PaddlePaddle object detection library PaddleDetection, the meters in the long-distance photograph are detected, and the robot camera pan/tilt is guided to perform focal length stretching to obtain a clear image of the dial. For the clear image of the dial, the models such as U-Net in the PaddleSeg semantic segmentation library are applied to extract the readings from the dial. The algorithm is with the edge-mediated inference engine provided by Paddle Lite, deployed on the embedded computing systems of the robot, to enable meter readings in the field.



### APPLICATION EFFECT:

The need of manned inspection on grid equipment has been reduced by 90%. Adapt to new meters in 1 week.  
The dial detection mAP can reach 0.9857. The errors of meter readings are upper-bounded by  $\pm 2^\circ$  with 99.01% recall.





# 07

## PADDLEPADDLE – INDUSTRIAL APPLICATION

WORK WITH PARTNERS TO HELP MORE AND MORE INDUSTRIES TO EMPOWER AI

### Agriculture

Smart peach sorter  
Saving almost 90% of manpower cost

### Forestry

Pest monitoring accuracy about 90%

### Charity

Tobacco control in public places

### Retail

Commodity sales forecast  
30%+ of reported loss in fresh food in a single store

### Manpower

AI builds the matching system  
Improving interview success rate by 4 times

### Manufacturing

Smart parts sorting  
Almost doubled efficiency

### Communications

Network failure warning for base station

### Real estate

Smart building management  
Saving almost 20% of refrigerating-consumed electricity

### Auto

Accuracy rate of charging pile failure warning close to 90%

## BAIDU AI STUDIO DEEP LEARNING COMPUTING POWER SUPPORT PROGRAM

OPEN UP FREE COMPUTING POWER RESOURCES WORTH 100 MILLION RMB TO HELP DEVELOPERS SUCCEED

### “ONE PERSON, ONE CARD” MODE

Everyone can enjoy one Industrial flagship V100 training card

#### SUPERIOR COMPUTING POWER

Three times of GTX 1080Ti graphics  
47 times of CPU (Xeon E5 2.6GHz)

#### 16GB VIDEO MEMORY

Facilitate large-scale network training

#### STORAGE SPACE UP TO 2TB

Support large-scale datasets

#### ACCESS METHOD

Run the built-in Notebook project on Baidu Brain AI Studio to get 12 hours of computing support per day, plus extra 48 hours after 5 days of continuous operation.

### REMOTE CLUSTER MODES

High performance GPU cluster

#### SINGLE-CARD 12 GB VIDEO MEMORY

#### MULTI-CARD PARALLEL TRAINING

#### FREE USE WITHOUT TIMELIMIT

#### USAGE METHOD

Only need to log in AI Studio to use

<https://aistudio.baidu.com>

-\* Baidu enjoys the final interpretation right of the event within the scope of laws and regulations.-

## ENTERPRISE SERVICE

### HUANGPU SCHOOL - ENLIGHTEN THE FIRST GENERATION OF CHIEF AI ARCHITECTS FOR CHINESE INDUSTRY

Cultivate deep learning architects, cultivate talents in the deep learning industry, and build the core technology circle of deep learning in China

- Face-to-face interactions between architects and Baidu deep learning T10 experts are provided.
- Unlock the development "Know-How" of deep learning learned from Baidu's core business
- Study enterprise development cases from both business and deep learning perspectives
- Assist enterprises to use AI thinking, AI tools, and methodologies to solve real business problems

**20+ deep learning experts wait here setting sail along with you**

### AI FAST LANE - ENTERPRISE DEEP LEARNING FIELD TRAINING CAMP

1000-enterprise deep learning technology application support plan provides enterprises with a fast lane for AI business transformation

- Deep learning case application analysis field
- Learn-to-use algorithm Code Live
- Deep learning technology scheme consulting of Baidu Technical Leaders

■ Huangpu College elite instructors participation

■ Huangpu essence courses sharing

■ Learn-to-use fast application course pack

### SYSTEMATIC TECHNICAL SUPPORT

- GitHub technical issues solved in the 24 hours
- Baidu AI technology ecological support
- Expert supports to technical challenges in developing top industrial applications
- Potential cooperations on training systems customization

For cooperation consulting, please send an email to [huangpu@baidu.com](mailto:huangpu@baidu.com)

## COOPERATION ON EDUCATION

### Deep learning training course | 8 sessions of class held, training 1,000 teachers from 400 colleges and universities

Supported by the Ministry of Education for new engineering construction, Baidu and key colleges and universities jointly create quality courses to train AI professional teachers

- **Practical curriculum design:** theoretical basis + high-intensity code practice; the teachers' technical level will get a leap improvement in 72 hours.
- **Supporting teaching materials:** including professional textbooks, teaching courseware, practice platform, practical cases and hardware teaching aids, to help colleges and universities start courses.
- **Teachers' experience exchange:** discussion on the ideas of how to start a course and teaching methods, from input to output, to bring about new ideas of AI teaching in colleges and universities.
- **Special Fund from the Ministry of Education:** the "Cooperative Education" Research Fund has been granted over 2 million yuan in total to support teachers in starting courses.

### AI Studio education version | introduced to 350+ colleges and universities

Provide leading teaching management and training platform to deeply cultivate practical AI talents

- **Online teaching environment:** practice environment for cloud deep learning project, free-installation, convenient and easy to use.
- **Free computing support:** free CPU/GPU hours to lower down the threshold for colleges and universities to start courses.
- **Built-in teaching experiment:** providing tremendous teaching experiment cases, from the introduction to the advanced level.
- **Practical teaching management:** the complete and practical teaching management features support the professional classroom teaching.



Scan to Apply

### PaddleCamp, oriented to the future deep learning engineers

Baidu's official online training camp for deep learning, helping beginners become senior developers in 4-6 weeks

- **Authoritative teaching team:** supervised by Baidu T10 architects and taught by certified evangelists.
- **Practice curriculum design:** providing exclusive practice platforms with GPU resources, and extending real problems from practice.
- **Multi-dimensional service system:** live broadcasting + recorded broadcasting + 24h Q&A, class adviser guidance, one-to-one work correction by teaching assistants.
- **Green employment channel:** recognized with the "Deep Learning Engineer Certification" certificate, outstanding students would receive full consideration for the positions in Baidu.



Study Now

## PaddlePaddle Deep Learning Education Partner Program

Providing comprehensive teaching support in content, platform and joint promotion, to help educational institutions start AI courses.

- **Rich Teaching Resources:** courses for newbies, seniors, and AI masters with enterprise development cases based on market demands.
- **Dedicated Platform:** Exclusive online learning zones with online programming platforms and free GPU hours for cooperative institutions.
- **Engages and Enrollments:** 1.5 million developers of Baidu AI open platform and 100 AI media matrices.
- **Career Opportunities:** obtain the "Deep Learning Engineer Certification" certificate, outstanding students recommended to Baidu.

## PaddlePaddle Tournament | 20+ competitions held, with total bonus of over 1 million yuan

A one-stop AI development platform that holds competitions to help deep learning developers at all levels to learn faster

- **Various events:** Baidu PaddlePaddle team is organizing Summits, Challenges, and regular completions, covering AI algorithms, industrial applications and creative demos, with generous packages of gifts such like cash and gift cards.
- **Free computing resources:** Free Tesla V100 GPU hours.
- **Technical platform support:** One-stop AI development platform provides an online programming environment, including events release, online team formation, project document sharing, real-time result evaluation, performance ranking lists and other technical support.
- **Expert guidance:** PaddlePaddle technical experts provides guidance and official baseline documents; senior team members share their experience online.

## PaddlePaddle PhDs Club | 100+ doctoral members now

China Deep Learning Club helps members to exchange cutting-edge technologies and expand high-end contacts in the industry.

- **Core developer communication circle:** Members of PaddlePaddle PhDs Club are all with PhD degrees or equivalence, with significant years of deep learning research and practical experience.
- **Offline high-end technology salon:** By the end of every month, Baidu core R&D engineers are scheduled to give lectures on cutting-edge technologies of deep learning and share the latest research and development results with members.
- **Research cooperation resources support:** Members who use PaddlePaddle in their scientific research may get chance to obtain cloud-mediated GPU hours and technical support from PaddlePaddle R&D Team.
- **Preferred cooperation in business ecology:** in case of any cooperation needs, the research institutes or enterprises where the members affiliate might be granted tremendous privileges such as consultation service for commercial cooperation and technical support from PaddlePaddle R&D Team.

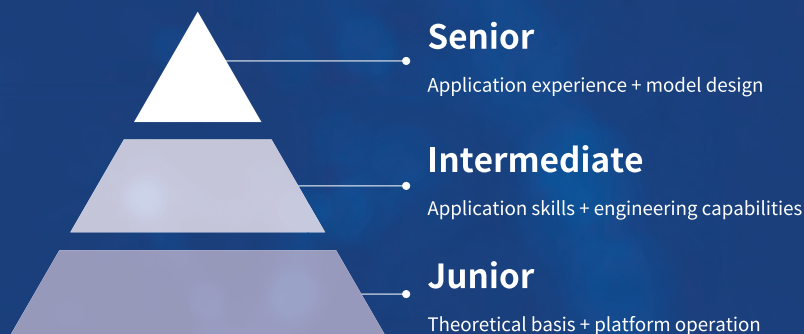
For education cooperation consulting, please send an email to: [paddle-up@baidu.com](mailto:paddle-up@baidu.com)



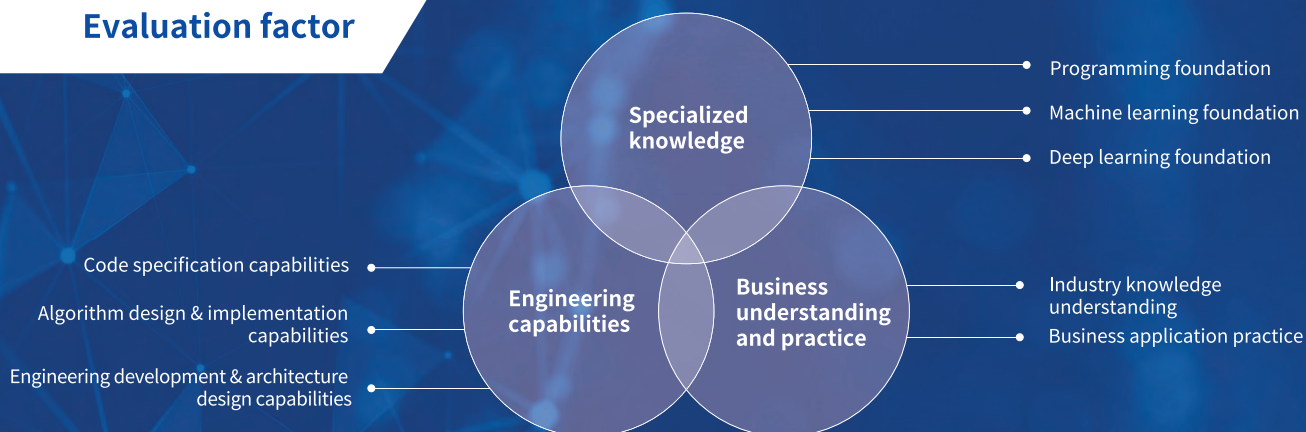
# 11

## THE FIRST DEEP LEARNING ENGINEER COMPETENCY CERTIFICATION IN CHINA

### Certification level



### Evaluation factor



Scan to learn more

