

# **Macao Funding Scheme for Key R&D Projects 2019**

## **Application Guideline for Projects of Artificial Intelligence**

### **I. Background**

Artificial intelligence is a strategic technology that leads a new round of scientific and technological revolution and industrial transformation, and it is a positive source of a strongly “Wild Goose Queue Effect”. Driven by new theories and new technologies such as mobile Internet, big data, supercomputing, Internet of Things, and brain science, artificial intelligence has witnessed accelerated development, demonstrating new application in deep learning, cross-border integration, human-machine collaboration, collective intelligence, and autonomous control. These new features are having a major and far-reaching impact on economic development, social progress, and the international political and economic landscape.

In line with China's *New-generation Artificial Intelligence Development Plan* that emphasizes on giving full play to Macao's advantages in the field of artificial intelligence, further integrate our existing advantageous resources, and improve research and development capabilities and industrialization level, the Macao Science and Technology Development Fund (FDCT) has sought the opinions of researchers in relevant fields in Macao and experts in Mainland China to

come up with the city's key R&D plan for artificial intelligence. The plan intends to meet the needs of China and play the role of Macao in phases by constantly improving local level of research and development and industrialization in the field of artificial intelligence. It will help promote the moderate diversification of Macao's economy with technology innovations, and contributes to the construction of the international innovation and technology hub in the Guangdong-Hong Kong-Macao Greater Bay Area, and contributes to building China into an innovation-driven country.

## **II. Overall Objectives**

In face of the urgent need for artificial intelligence in the industrial upgrading of the Greater Bay Area, the scheme aims at supporting projects that seek to make breakthroughs in significant basic frontier technologies of new institutions/materials/driving/sensing/control and bionics, intelligent robot learning and cognition, human-machine natural interaction and collaborative integration, etc., combined with the scientific research foundation of Macao. It is expected to strengthen the application of new-generation information technology in robots, and provide basic frontier technology reserves for improving the intelligence level of robots in Macao; at the same time, it aims to accelerate the development of technology and industry in the field of artificial intelligence in Macao through collaborative standards system

construction, technical verification platform and system construction, and typical application demonstration.

### **III. Research Directions**

This guideline focuses on the three directions, namely new machine learning theory, intelligent vehicles, and intelligent operational technology of industrial robots. The projects should cover four aspects including basic frontier technology, generic technology, key technology & equipment, and application demonstration of robots, in accordance with the requirements of “focusing on the industrial chain and planning for the innovation chain”.

The implementation period for each direction is 3 years at maximum, and the total amount of grants funded by the FDCT for these three directions is MOP 30 million.

#### **1. New Machine Learning Theory**

**Content of Research:** Exploring new multimodal machine learning methods, studying fusion learning of different modalities, improving the interpretability and robustness of machine learning systems, and exploring applications in vision, languages and other fields, in face of the challenges of machine learning and artificial intelligence in the post-deep learning era.

#### **2. Intelligent Vehicles**

**Content of Research:** Studying the organizational framework,

behavioral patterns and incentive mechanisms of large-scale group collaboration in an open, dynamic and complex environment to meet the intelligent demand for motion control of various mobile platforms for unmanned vehicles, and developing intelligent networked vehicle visual perception and human-computer interaction system and intelligent vehicle operating system, and building a human-computer interaction scene database.

### **3.Intelligent Operational Technology of Industrial Robots**

**Content of research:** Carrying out research on deep integration technology of artificial intelligence and intelligent manufacturing for breakthroughs in key core technologies such as unstructured environment and instant perception of complex workpieces; exploring large-data collection and analysis, mining and optimization methods of process parameters, and developing intelligent operational system for industrial robots, such as welding, grinding, assembly and spraying to verify applications for complex work tasks.

## **IV.Application Requirements**

The applicant entities should submit the application in the form of projects according to the content of research in one of the directions listed in this guideline. Any project with subject(s) under it should be declared as a whole. Unless otherwise stated, there should be no more than three subjects under each project. The leading entity of the project must be a

Macao institution. Entities outside Macao are encouraged to participate in the form of cooperation. Each project should contain no more than 6 entities.

In order to give full play to the role of the market, strengthen the close integration of production, education and research, and mobilize social resources to invest in artificial intelligence research and development, projects applied by enterprises as a leading entity should have at least equal amount of counterpart funds and application funds (1:1). Projects participated by enterprises should also have a certain amount of counterpart funds.

The maximum amount that can be applied for by each project is MOP 15 million.

## **V. Experts Involved in Guideline Preparation**

Huang Tiejun      Professor, Peking University

Zhao Jie            Professor, Harbin Institute of Technology

Ou Yongsheng    Researcher, Shenzhen Institutes of Advanced Technology,  
Chinese Academy of Sciences

Chen Xilin         Researcher, Institute of Computing Technology, Chinese  
Academy of Sciences

Yang Shiqiang    Professor, Tsinghua University