

Macao Funding Scheme for Key R & D

Projects 2023

Biomedicine

Application Guideline for Projects of Intelligent Diagnosis and Treatment

I. Background

The use of medical artificial intelligence technology to assist with diagnosis and treatment has brought new opportunities to improve medical and health service capabilities and solve the shortage of medical resources. Intelligent diagnosis and treatment are the most important and core application scenario of artificial intelligence in the medical field. In 2017, the “New Generation of Artificial Intelligence Development Plan” issued by the State Council clearly stated that it will “promote the application of new models and methods of artificial intelligence treatment, and establish a fast and accurate intelligent medical system”. In 2022, the Ministry of Science and Technology issued the “Notice on Supporting the Construction of New Generation Artificial Intelligence Demonstration Application Scenarios”, in which intelligent diagnosis and treatment are listed as one of the first ten demonstration application scenarios to support the construction.

The big health and high-tech industries are the key

development areas clearly identified by the Macao SAR Government in its Policy Address for the Fiscal Year 2023 and the “Second Five-Year Plan for Economic and Social Development of the Macao Special Administrative Region (2021-2025)”. Macao possesses a certain R&D foundation in the fields of artificial intelligence and medical health, and fostering the integration of artificial intelligence and medical health will greatly enhance the level of the medical industry and is of great significance for improving Macao’s comprehensive strength in technological innovation.

In order to leverage Macao’s strength in intelligent diagnosis and treatment, further integrate existing advantaged resources, and upgrade its R&D capability and industrialization level, the Macao Science and Technology Development Fund (FDCT), based on soliciting opinions of scientific researchers in relevant fields in Macao, and relying on the strength of Mainland experts, researched and proposed this key R&D project on intelligent diagnosis and treatment, meeting the needs of China and leveraging Macao’s strength in a planned and step-by-step manner. Through various scientific and technological monitoring technologies, Macao’s moderate economic diversification and the development of the Guangdong-Macao In-depth Cooperation Zone in Hengqin could be better facilitated, assisting in the construction of an international innovation and technology hub in the Guangdong-Hong Kong-Macao Greater Bay Area and

thereby contributing to the building of China into a new country.

II. Overall Objectives

To carry out R&D of new technologies for artificial intelligence-assisted diagnosis and treatment and intelligent platforms, relying on Macao's R&D foundation in the field of artificial intelligence, combined with the construction of an international innovation and technology hub in the Guangdong-Hong Kong-Macao Greater Bay Area and the development needs of Macao's new generation of artificial intelligence industry. To develop a clinically oriented intelligent diagnosis and treatment system, enhance Macao's technological innovation capabilities, and promote the development of Macao's big health industry, through artificial intelligence algorithm design and key technological breakthroughs.

III. Research Fields

Field 1: Research on artificial intelligence-assisted diagnosis and treatment technology for degenerative diseases

To meet the needs for non-invasive diagnosis and treatment of neural degenerative disease, with the aid of artificial intelligence algorithms and functional ultrasound technology. In addition, emphasis will be placed on the identification and classification of early neural degenerative diseases to study their

pathogenesis and carry out early warning and intervention, and develop ultrasonic brain functional imaging and brain stem pre-prototype that can be used in human body assisted by artificial intelligence.

Performance Indicators: Developing a set of prototypes that can be used for human non-invasive ultrasound brain functional imaging and neuromodulation. The performance index shall fulfill the followings:

- (1) The spatial resolution of ultrasound brain functional imaging is not lower than 200 microns, and the temporal resolution is not lower than 10 Hz.
- (2) The spatial resolution of the ultrasonic neuromodulation system is not less than 4 mm, and the control depth is not less than 10 cm.
- (3) Realizing the identification, classification and integrated diagnosis and treatment of different types of neurodegenerative diseases at different stages, and providing application demonstrations, through automatic, high-throughput early screening based on artificial intelligence.

* The above performance indicators (1) – (2) must be certified by a recognized third-party test.

Field 2: Development of artificial intelligence-assisted

diagnosis and drug screening platform for malignant tumors

Aiming at the demand for intelligent diagnosis and treatment of high-incidence malignant tumors in the Guangdong-Hong Kong-Macao Greater Bay Area, with multimodal data and artificial intelligence algorithms, to build a new generation of early diagnosis, prognosis prediction models and targeted drug screening platforms for high-incidence malignant tumors, and carry out clinical application research, improve the accuracy of malignant tumor diagnosis, screen new targets of anti-tumor drugs, and design effective compounds.

Performance Indicators: Developing a multi-modal intelligent diagnosis model and drug screening design platform based on omics data such as imaging, pathology, medical records, and genes. Models and platforms are subject to third-party testing.

Requirements for the intelligent diagnosis model:

- (1) The scale of the model is not less than 10 billion parameters.
- (2) The number of cases is not less than 1,000, and the application is carried out in at least 5 hospitals (which must include 1 hospital in Macao).

Requirements for the drug screening design platform:

- (1) Screening out no less than 3 effective targets, designing no less than 5 compounds, and completing the preclinical efficacy verification.

IV. Application Requirements

- (1) The applying entity shall file the application in the form of a project in one of the research topics in any of the fields listed in this Guideline. Unless otherwise specified, a project should include no more than 3 topics.
- (2) Each project should be submitted for the application as a whole, and all the research contents and performance indicators must be covered.
- (3) The lead unit shall be a Macao entity, Macao and Hengqin enterprises are welcome to participate in cooperation. The number of participating units for each project shall not exceed 6.
- (4) Every project leader or topic leader(s) must be qualified to work full-time in Macao.
- (5) Priority is given to joint hospital applications, and a formal cooperation agreement shall be provided.
- (6) The implementation period of the project is 3 years. The maximum application amount for each project is MOP 15 million.

V. Experts Involved in the Formulation of the Guideline

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