

二、研究計畫中英文摘要：

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In Productivity 4.0, an important characteristic of the production systems (e.g., machines, warehouses, and operating entities in production) is that, the systems can communicate with each other, interpret available data, trigger actions and have the capability for autonomous self-control and self-optimization. An important application scenario in Productivity 4.0 is production using intelligent machines or smart factories. One major challenge in such scenario is that, the number of production machines is usually large. What make it more challenging are the complexity of setting up the production parameters and the diversity of production machines. Considering the pressure from the production delivery time and the production cost, the manufacturers cannot afford any failure or anomaly in production, since a failure or an anomaly can stop the production line. The consequence is the decrease of the yield rate and the production uptime, which can translate to direct profit loss and indirect reputation damage. In the past nine months, the NCU research team have achieved high-quality cooperation with two manufacturing companies, Adlink and Tong Hsien, including 50+ meetings and 1600+ per-person-hours. The two manufacturers urgently demand Productivity 4.0 solutions because their production style is mall-volume, large-variety. After working with the two manufacturers for more than nine months, the NCU team eventually realized their major challenges and problems in their production line, and how to apply the big-data-based Productivity 4.0 technologies to their production lines. To this end, the NCU team proposes to develop several key technologies of Productivity 4.0 with the two manufacturers: the progressive prediction model for production delivery time, the root-cause-analysis (RCA) technology for particular production routing problems, the platform to support big data analysis, and the online decision support system for particular production lines. The NCU team aims to achieve the two goals with the four key technologies. The first goal is to build an online prediction system for production delivery time. The new system is expected to reduce 10% of the yearly gross business loss in Adlink production lines (NT\$ 100,000 thousand dollars), due to unavailability of on-time production delivery to their customers. The second goal is to build a root-cause-analysis (RCA) system for particular production routing problems. The system is expected to improve the yield rate of the production lines in Tong Hsien from 82% to more than 86.5%, which translates to NT\$90,000 thousand dollars in a year.

Keyword: Big Data Analysis, Cloud Platform, Productivity 4.0, Progressive Prediction, Rule Mining.