## 二、計畫摘要(請分別以中、英文就全部計畫作一概述，以五百字為限)

**1.中文部份**

| (關鍵詞)：霧運算、工作排程、動態工作轉移、串流資料處理 |
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| 一般來說，智慧生產線將需要在各個生產機台上佈置偵測器進行監測，並將原始資料持續導向人工智能軟體元件進行分析。而當智慧工廠的規模變得非常龐大時，管理這些偵測器以及處理偵測器所產生的大數據資料流，都會是難題。為了解決上述的問題，智慧生產線系統架構需要向雲端、霧端與終端協作演進，也就是所謂的霧運算 (Fog Computing) 架構。本研究預計先建立一個簡易的模型，用來評估基於固定資料流處理路徑的雲端與霧端協同合作系統之效能(反應時間)與運作支出(執行成本)，以及其最大終端偵測器的容納量(霧端負載)。我們也將提供另一個允許動態資料流處理路徑變換的架構，讓邊緣伺服器的運算工作負載可以動態轉移到其他伺服器運作，然後利用這個新模型來評估雲端與霧端協同合作系統之效能(反應時間)與運作支出(執行成本)，以及其最大終端偵測器的容納量(霧端負載)。最後我們會比較上述兩個模型的優缺點，並建立上述兩個模型之驗證環境於雲端平台上。 |

**2. 英文部份**

(KEY WORDS)：Fog Computing, Task Scheduling, Task Migration, Streaming Data Processing

In this proposal, we aim to develop two fog computing performance models to estimate processing latency and cost for a streaming data processing system based on the fog computing paradigm. The sensors in the target fog computing system are partitioned in groups, and each group generates $m_i$ tasks in T seconds. The tasks are sent to the data filtering/transformation component and then to the data analysis component inside an edge server. Eventually, the results are sent to the cloud for further processing. In each processing cycle, every edge server must deliver its results as soon as possible, such that data processing at the next cycle will not be delayed. We will first develop a fog computing architecture that assumes that the data paths are fixed, and provide a performance model for the architecture. Second, we will develop a fog computing architecture that enables dynamic task re-scheduling, and provide a performance model along with the task-re-scheduling algorithm for the architecture. Finally, we will implement the prototypes of the two architectures on a cloud environment to show how task re-scheduling improves performance.