

RTCourier: Predictable Instant Delivery by Real-time Courier Scheduling

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ABSTRACT

Real-time Courier Scheduling

1. INTRODUCTION

Real-time Courier Scheduling

2. MOTIVATION

In a typical process of instant delivery service, customers place orders through the Ele.mes online platform. The platform will notify the merchants to prepare the takeaway packages. Couriers will be dispatched to pick up the packages and deliver them to the customers. In current courier dispatching system ...

2.1 Data Description

We have ...

2.2 Data Analysis and Observed Issues

My guess:

- very few couriers deliver multiple packages at a time.
- Lots of packages are delivered too early.
- Travel distance per package.

2.3 Insights

Due to the unpredictable waiting time in restaurants, the timing correctness of package delivery is guaranteed by over provision of couriers.

Our goal is to guarantee predictable and bounded waiting time at the restaurants for each courier in our system, achieving the win-win result for both the company and couriers: more packages are delivered by a courier per day, while less couriers are employed by the company.

3. DELIVERY TIME FORMULATION

3.1 Instant Delivery Scenario

A typical instant delivery service involves four roles and four steps. (i) Customers place orders online through the platform; (ii) The platform notifies the merchants to prepare the products and make the packages; (iii) The platform assigns

a courier to pick up the packages; and (iv) the courier delivers the packages to customers.

Thus, the delivery time consists of three parts:

- Navigation time to the restaurant
- Waiting time in the restaurant
- Driving time to the destination

4. WAITING TIME CALCULUS

4.1 System Model

Based on the description of the instant delivery scenario, in our instant delivery system...

4.2 Real-time (RT) Cooking Scheduling

We now mathematically describe our system model.

4.3 Intuitive Ideas behind RT Cooking

4.4 RT Cooking Task

The cooking task is modeled by four parameters:

- Estimation for the cooking period.
- Estimation for the cooking time.
- The deadline for each package
- Estimation for the cooking capacity.

4.5 RT Cooking scheduling algorithm

Similarity between real-time task scheduling and RT cooking scheduling.

4.6 Upper bound on the Waiting Time

Response time analysis.

5. RT COURIER SCHEDULING FRAMEWORK

According to the delivery time model given in section 3, we will propose a novel RT Courier Scheduling Framework, named RT Courier.