**Scheduling Aircraft Landings – The Static Case**

Cátia Teixeira, Sónia Ferreira and Vasco Bartolomeu

Master’s degree in Data Science & Engineering, Faculty of Engineering - University of Porto

Analytical Decision Support Systems

January 2023

**Abstract:** This paper presents the problems of scheduling

**Keywords:** Aircraft landing scheduling, Delay minimization, sequence-dependent scheduling, Runway operation, Mixed integer programming, Constraint programming.

# Introduction

(including a description of the problem and the objectives of the paper)

Over the past few decades, air traffic has experienced tremendous growth, as AIR transport becomes one of the fundamental modes of transport for personal and business travel, and commercial delivery. However, in 2020 due to the worldwide COVID pandemic (that started that year), the industry observed a setback in their numbers, with less traffic for passengers and freight traffic and their growth has dropped tremendously [1]. In 2021, the numbers rose to show an improvement from 2020, but they are still very far away from the pre-pandemic numbers [2].

Nevertheless, for maximum efficiency of resources and to overcome the problems observed in the past decades when the increase of air traffic causes a drastic increase in the number of aircraft take-offs and landings within a given period at a certain airport or runaway, that results in an overload issue in terms of airport capacity and delay issue in terms of aircraft scheduling. Furthermore, delays in traveling and delivering are costly for airline companies, as they will result in loss of profits if the customers are not satisfied.

In resume, considering the increase in air traffic, the efficient management and scheduling of aircraft take-offs and landings (given the limited resources such as time, budget, etc..) have become a very challenging and complex problem for air traffic controllers.

Air traffic control (ATC) aims to control air traffic, to prevent collisions and delays. ATC is usually operated by humans and therefore human error can happen.

# Problem Context

# Problem Formulation

# The MIP Model

# The CP Model

# Computational Results

# An analysis of the tests and results (including some KPIs on the difficulty of the instances and resolution time) (asked by the teacher)

# Conclusions

# References

|  |  |
| --- | --- |
| [1] | International Civil Aviation Organization, “ICAO - United Aviation,” [Online]. Available: https://www.icao.int/annual-report-2020/Documents/ARC\_2020\_Air%20Transport%20Statistics\_final\_sched.pdf. [Accessed 01 2023]. |
| [2] | International Civil Aviation Organization, “ICAO - United Aviation,” [Online]. Available: https://www.icao.int/Newsroom/Pages/2021-global-air-passenger-totals-show-improvement.aspx. [Accessed 01 2023]. |