Programming Enterprise Resources From Libraries In Python

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Abstract

The new Industry 4.0 and smart manufacturing are part of a transformation in which production and information technologies are integrated to create innovative management and operations systems that optimize manufacturing processes for greater flexibility and resource efficiency. Creating a value proposition for end consumers. These new manufacturing methods require the introduction of new data analysis and modeling tools, including several prior knowledge topics rarely used in manufacturing operations, such as linear programming and research models. The purpose of this article is to analyze, interpret and determine the production sequence of various production processes regardless of the type of article or product that requires manufacturing, in this order of ideas the main focus will be the Flow Shop algorithm system applied to the industry, which due to its step-by-step model optimizes the total time in the production system.

Keywords: industry, optimization, homogeneous process, sequence, production system.

Introduction

In this article, we are going to introduce ourselves into the environment of production systems, hand in hand with a productive scheme known as FLOW SHOP, looking for production with PYTHON under this System. Flow Shop is a work methodology applied in companies, where sequences of repetitive patterns are executed that are incorporated into the production process to achieve optimization in operations and obtain an effective result (Galarza, 2022).

In the industry, different types of production processes are applied, according to the need to be supplied and the type of client that requests it. There are companies that go to workshops, where their main activity is the manufacture of a type of product through a homogeneous process, where they manage to produce small batches of the product for a specific client (Hilguera, Riaño, & Méndez, 2022).
For industries that require manufacturing a medium number of products with few article references, the Flow Shop application is ideal, since it focuses on executing repetitive patterns to achieve optimization of operations. This methodology is widely applied by companies engaged in food production or the manufacture of household appliances such as washing machines or blenders (Goyeneche, 2022).

A FLOW SHOP scheme, is presented as a production route that must be organized sequentially, it is nothing more than a mass production system, where stages are met and we can see a low variety of products, but high volumes and great speed of manufacture. The products go from machine to machine, respecting each one's time until they can come out as a finished product. Remembering that the tasks go through each machine in cascade.

This work methodology follows an orderly execution throughout the production process, to finally obtain the desired product. Transformation goods are modified by a series of machines that execute the same processing patterns, in order to obtain products with invariable characteristics with a notable optimization of time in operations (Márquez, 2020).

The Flow Shop allows to carry out a fast and efficient manufacturing, since its objective is focused on standardizing the processes to achieve a mass production, granting in the same way, the minimum margin of error in the similarity of the products. One of the characteristics of this methodology that attracts the most attention from the production industry is the optimization of time (Hernández, 2021).

The mechanization of processes and the projection of possible orders are benefits offered by the implementation of Flow Shop in companies, all in order to seek improvements in productivity (Briones, 2021). A transition from MRP software (resource management) was reflected, processes to plan production and record stock easily and quickly to the APS software (specify production needs), both aimed at providing solutions to the industrial sector (Alberdi, 2019).

Technological advances have benefited the implementation of the Flow Shop, thanks to this, it has been possible to improve:

- Good planning to specify the execution of the processes of input and transformation of resources.
- The control of merchandise, the companies in charge of providing the necessary materials for the production and the organization of the process to request transformation materials from suppliers.
- Good inventory management of goods destined for transformation, in order to reduce the deficit of materials and achieve a balance between the quantity of goods produced and the quantity of goods that consumers wish to purchase.
and materials exactly necessary.

• Continuous monitoring of the production process, where alerts are generated when unexpected situations are found that affect productivity in operations.

• The guarantee of quality in the processes for the correct storage of the products and their final disposal.

• Taking as an important factor the quantity of products that are manufactured and the delivery periods that have been established, to recognize how optimal the operation is.

• The knowledge of the sustainability of the company, the production indicators and the usefulness of the machinery (Jiménez, 2020).

Through a technological manufacturing program, it is possible to automate tasks such as forecasting the possible sales of the product, the necessary supply and the control of each order that is requested; in addition to ensuring the desired flow of the product through the execution of repetitive patterns (Navaro, 2020).

**Flow shop production and its characteristics.**

Adequate machines and tools to supply all the operations carried out for the manufacture of the product. Obtain higher profits through the proper use of production assets, in order to reduce losses and be able to offer a product at a considerable price. Standardization of operations, to be able to manufacture a large number of products with few references, thus managing to produce large volumes of product.

Using the machines and materials exactly necessary for production, the execution of manufacturing projects based on sales predictions, and the start-up of operations with repetitive patterns, are the result of the implementation of a technological manufacturing program, in order to have a detailed knowledge of operations and achieve their optimization (Perilla, 2021).

**Programming and sequencing of operations.**

The planning and sequence of repetitive patterns seek to identify the methods that must be carried out to execute the operations in an orderly manner, adequately assigning the machinery and other tools to carry out the necessary tasks and have an established time to measure the productivity of the processes and achieve job optimization. The resources and methods to follow are diversified according to the industry in which you are interacting (Estupiñan, 2021).
As an example of resources, we can take into account the use of machinery that works in specific work places, such as excavators that operate in construction, or the use of tools such as loading auxiliaries that support the loading and unloading of merchandise (Cardona & Medina, 2019).

On the other hand, the methods are the sequence of activities that are carried out in the manufacturing process, the inputs and outputs of transformation goods or products in the distribution centers and the processes that are part of a technological development program (Sanchez, 2020).

Within the work methodology, certain activities can be prioritized according to their execution time, and those that require small periods of time or those that have a completion limit can be executed immediately, without neglecting the other activities that are also important to have an effective production process (Rodríguez, 2022).

Regarding the processes that are to be improved, different execution methods can be carried out to achieve the objective (Diaz, 2020). One of the ways to achieve this is to be able to reduce the existing discrepancy between the time that was established to carry out the operations and the deadline, or to reduce the total time that had been required to completely complete the operations pending to be carried out (Valencia, 2022).

The difficulties associated with the projection of manufacturing and the sequence of repetitive patterns are an issue that worries business managers, over the years the great importance of this process and its influence on the process have been studied and detailed. business growth (Dueñas, 2020).

Every day it becomes a challenge to find the correct ways to optimize operations and give priority to fast execution tasks, in order to have a higher performance and minimize the loss of materials and time, for this reason, methods are constantly being studied that provide a solution to these problems and favor productivity in operational processes (Namicela, 2021).

The projection of manufacturing and the sequence of repetitive patterns is important for companies that are dedicated to the production process, just as it greatly influences information development efforts (Rodríguez, 2022).
These improvement actions are also significant when they are implemented in the companies that are dedicated to the logistics operation, since the optimization of time is one of the determining factors to generate productivity when executing the tasks of transport and distribution of products (Jaimes & Sequeda, 2020). We must not leave aside the different types of companies that provide services, the organization of tasks and optimization of time are actions that greatly favor their operation (Cordero, 2020).

**Exact optimization methods.**

These methods allow us to identify an efficient result for a specific problematic situation. The purpose is to investigate and find the exact plans to carry out that adjust to the problem to obtain a solution that improves productivity and optimization of processes (Collado, 2021).

These difficulties have a progressive development, so it is important to take into account that small improvements must be implemented in all processes in order to identify the solutions according to the planning of tasks, and to be able to follow an established plan of methods to follow that allow carry out the processes in the best way and achieve it in the established time, to meet the need demanded by the client and increase the development of the company with the improvements applied (Castillo, 2021).

The main methodologies applied to solve these problems are explained below:

**Full enumeration:**

The method consists of estimating and specifying the possible solutions in an orderly manner, then, having this clear, we can evaluate and decide which methods are efficient or inefficient to solve the problem posed, taking into account that these difficulties have a progressive development (Rodriguez D., 2021). This is the simplest method that is known to solve the problems of applying repetitive sequences and planning the development of tasks in favor of productivity and optimization of the time established for the processes (Gonzáles, 2019).

**Whole programming.**

This type of methodology focuses on detailing whether the solutions proposed to the problems are really optimal, taking as a verification factor that several of the types of solutions that are considered to be applied to programming have the ability to detail integer values (Vega & Lopez, 2020).
The most widely used method to solve this type of problem introduced into integer programming is the technique that is associated with a large set of solutions, where there is a breakdown of different types of solutions that emerge from a main solution (Gonzáles J., 2022). Problems of this nature need planning that is based on a sequence of well-defined tasks that allow solving the identified difficulty, formulating the solution through linear processes, thus also optimizing an objective in a linear way (Gonzáles H., 2019).

The detail of implementing this methodology is the great variety of possible solutions that we can find, which entails the difficult task of choosing the one that best fits all the company's operating processes (Castro, 2020).

**Branching and pruning.**

The methodology in question is the most important of exact optimization. (Galvis & Forero, 2019). This methodology is part of the techniques that manage to provide solutions to complete linear problems, refraining from analyzing all possible solutions (Pérez, 2021). It achieves this by estimating and specifying the possible solutions in an orderly manner. to be able to evaluate and identify which are the truly efficient ones that deserve to continue being part of the process (Sanz, 2020).

It is characterized by the role played by the algorithm when identifying in which part of the solution structure an adequate development of these is not being presented, to place itself in it and eliminate it from the structure, in order to avoid unnecessary use of resources and operations, when they are not coupled to an effective solution; this helps to reduce the degree of difficulty that may arise in the computational area, and demonstrates the effectiveness of the methodology (Caro, 2021).

**Python 2.7 language**

Python is used to develop intelligent programs, applied to data collection and development, and the system that allows technological devices to learn. It is a programming language used in various Internet sites. Its creator, Guido van Rossum, showed it to the public in 1991 (Chazallet, 2016).

This language is based on the focus on the ease of understanding the codes, which provide a structure that allows simple programming for small applications and large software. Individuals who develop programs make use of Python because it fulfills its function perfectly and is easy to use, as well as being able to run on different platforms (Pino & Rivera, 2016).

Python has a dynamic system and automatic memory management. It can be executed in different fields of programming, including those dedicated to objects, those that contain commands, functional ones, and those of processes to be carried out, also having a well-equipped standard information collection (Bermúdez, 2017).
Advantages of the Flow Shop and sequencing models in industrial production.

These are some of the advantages of the Flow shop and the sequencing models in industrial production:

Constant monitoring of operations, since they are carried out following repetitive and specific patterns, which focus their efforts on replication of the product (Morales & Buitrago, 2013). This model also facilitates the identification of possible inconveniences that the machinery may present and solve them, to avoid manufacturing defects (López, 2013).

The production process takes a particular characterization of repetitive patterns, with which it is possible to generate a large-volume product manufacturing. This model is implemented by companies that specialize in the production of items with certain specific qualities (Rodríguez, Muñoz, & Bernal, 2016). Greater optimization with possible purchase orders, since these allow the manufacturer to focus on the products that is more in demand, make a provision of what is possibly acquired and have these products ready to give final details and be prepared for possible orders without having to have unnecessary production that could end up in losses (Prieto, Heredia, & Arango, 2017).

conclusions

Flow Shop is undoubtedly a tool that greatly benefits companies that decide to implement it. This helps to mechanize processes, have large volume production with minimum error rates, have detailed control and management of all operations, evaluate solutions that really generate optimization in processes and discard those that do not to avoid loss of resources and work, and project the possible volumes of production necessary to be prepared for customer demand, in addition to helping to identify the necessary quantities of production goods and the type of machinery necessary to carry out the processes in the best way, thus avoiding situations that may alter the order of production or possible failures in the operation of the machines.

In conclusion, this work methodology allows obtaining greater productivity in manufacturing, through the implementation of repetitive sequences that streamline processes and allow large quantities of the same product to be produced in record time, as well as making available to the producer a detailed control of the execution of the operations, the machinery, and the good use of the goods of transformation, to obtain products of the best quality and to reduce in a maximum percentage the errors or losses, besides allowing him to project the possible sales for have a pre-operation of these and be able to respond in a timely manner to the imposing demands that customers have today.

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