INSTITUTO TECNOLÓGICO VALE

ITV MI TECHNICAL PRODUCTION

A SAG MILL SIMULATION PLATFORM ENABLING REINFORCEMENT LEARNING CONTROL EVALUATION BY ITV AND AI CENTER CANADA
Parcial Report, Project OptiPlant

ITV Authors:

Thomás Vargas

Carlos Sacramento

Luciano Cota

Thiago Euzébio

External Authors:

Bala Manickam

Ashish Kumar

Ouro Preto

Minas Gerais, Brazil

October/2020

Title: A SAG Mill Simulation Platform Enabling Reinforcement Learning Control Evaluation by ITV and AI Center Canada	
ITV MI TECH. PROD.N0024/2020	Version
Classification: ( ) Confidencial ( ) Restrita (X) Uso interno ( ) Publico	01

Confidential Information - Strategic information for the Institute and its Maintainer. Its handling is restricted to users previously authorized by the Information Manager.

Restricted Information - Information whose knowledge, handling and access control should be limited to a restricted group of employees who need to use it to perform their professional activities.

Internal Use Information - Information intended for internal use by employees and service providers.

Public Information - Information that can be distributed to outside audiences, which is usually done through the appropriate corporate channels.

International Cataloging Data in Publication (CIP)

EXECUTIVE SUMMARY

The path toward Deep Reinforcement Learning (DRL) applications in real plants requires a first step into tests on simulation platforms. The simulation enables fast and secure learning for the control algorithm, which minimizes development time and investments. In this way, ITV and AI Center have worked together to provide a reliable platform for testing Deep Reinforcement Learning control algorithms in mineral processing plants' digital models. This document describes a SAG milling circuit simulation (running in Brazil) and how it can communicate in real-time with the DRL algorithms (running in Canada).

ABSTRACT

Simulation platforms enables fast and secure development and testing of control strategies, also minimizing work time and investments. ITV and AI Center have worked together to provide a reliable platform for testing Deep Reinforcement Learning control algorithms in mineral processing plants' digital models. This document describes a SAG milling circuit simulation (running in Brazil) and how it can communicate in real-time with the DRL algorithms (running in Canada).

Keywords: Reinforcement learning. Digital model. Process control