

# Rank Optimization

Lionel Chiron

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## Abstract

Your abstract.

## 1 Introduction

We devise here an analytical solution for the rank optimization for the approximation through random projections. This solution is then compared to the numerical approach.

## 2 Filling equation

$$u' = -\frac{P_s u^2}{P_s u^2 + P_n v^2} / s \quad (1)$$

$$v' = -\frac{P_n v^2}{P_s u^2 + P_n v^2} / n \quad (2)$$

we deduce

$$\frac{u'}{u^2} - \frac{P_s n}{P_n s} \frac{v'}{v^2} = 0 \quad (3)$$

$$pu' + nv' = -1 \quad (4)$$

with  $m = \frac{P_s n}{P_n s}$   
it follows

$$\frac{1}{u} - \frac{m}{v} = k \quad (5)$$

$$pu + nv = l - t \quad (6)$$

Hence

$$n\left(\frac{p}{n}t + k\right)u^2 + ((p+n) + (l-t)\left(\frac{p}{n}t + k\right))u - (l-t) = 0 \quad (7)$$

giving the solution

$$v = \frac{(l - mn - p - t) - \sqrt{(l - mn - p - t)^2 + k4n(t - l)}}{2kn} \quad (8)$$

### 2.1 How to add Citations and a References List