Algorithms for Planar Maximum Covering Location by Ellipses Problems

Danilo Tedeschi
Dra. Marina Andretta

Universidade de São Paulo

25 de Outubro de 2019

This research has been funded by Cordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). This is part of a Master's research project on the problem: *Planar Maximal Covering by Ellipses with Rotation*.

Introduction

Two versions:

- Planar Maximum Covering Location by Ellipses Problem (MCE) [CvM09];
- Planar Maximum Covering Location by Ellipses with Rotation Problem (MCER) [AB13].

Introduction

Ellipse

The shape of an ellipse is given by its major-axis and minor-axis, $(a, b) \in \mathbb{R}^2$, with $a > b > 0$.

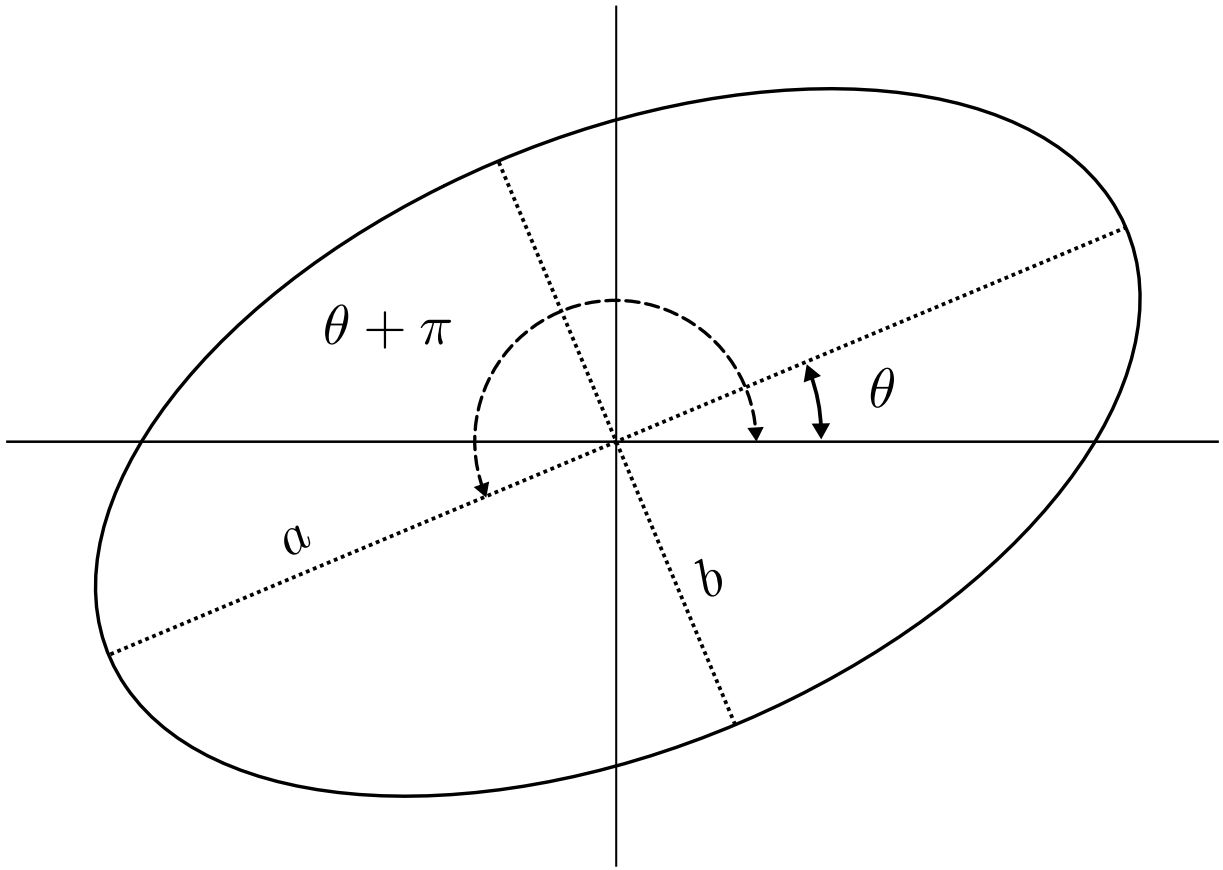

Figura: An ellipse with shape parameters a and b.

MCE

Definition

Demand set $\mathcal{P} = \{p_1, \ldots, p_n\}$;
Weights $\mathcal{W} = \{w_1, \ldots, w_n\}$;
Shape parameters $\mathcal{R} = \{(a_1, b_1), \ldots, (a_m, b_m)\}$, $a_j > b_j > 0$.
Set of functions $\mathcal{E} = \{E_1, \ldots, E_m\}$, $E_j(q_j)$ is the j-th ellipse's coverage region.

References I


M. Andretta and E.G. Birgin, *Deterministic and stochastic global optimization techniques for planar covering with ellipses problems*, European Journal of Operational Research **224** (2013), no. 1, 23 – 40.


M. S. Canbolat and M. von Massow, *Planar maximal covering with ellipses*, Computers and Industrial Engineering **57** (2009), 201–208.