

# Contents

<b>Resumen</b>	<b>iii</b>
<b>Abstract</b>	<b>v</b>
<b>Agradecimientos</b>	<b>ix</b>
<b>Introduction</b>	<b>1</b>
<b>1 Preliminaries on proximal algorithms and generalized distances</b>	<b>7</b>
1.1 Introduction . . . . .	7
1.2 Decomposition methods . . . . .	11
1.2.1 Alternating direction method of multipliers . . . . .	11
1.2.2 Predictor corrector proximal multiplier method and some its variants	14
1.3 Generalized proximal distances . . . . .	18
1.3.1 Definition and main properties . . . . .	18
1.3.2 Compatible proximal pairs and convergence of proximal methods . . .	20
1.3.3 Examples of compatible proximal pairs . . . . .	24
<b>2 Alternating direction method with interior proximal regularization</b>	<b>31</b>
2.1 Introduction . . . . .	31
2.2 The inexact RIPADM algorithm . . . . .	34
2.3 Global convergence of the inexact RIPADM . . . . .	36
<b>3 Relaxation factor</b>	<b>49</b>
3.1 Introduction . . . . .	49
3.2 Convergence results . . . . .	50
<b>4 Numerical Experiences</b>	<b>61</b>
4.1 Introduction . . . . .	61
4.2 Applications . . . . .	63
4.2.1 Constrained LASSO problem . . . . .	63
4.2.2 Constrained LASSO problem with a cost function . . . . .	66
4.2.3 Twin support vector machine classifier . . . . .	68
4.3 Relaxated Decompositon Methods . . . . .	71

4.3.1	Constrained LASSO problem . . . . .	72
4.3.2	Twin support vector machine classifier . . . . .	73
4.4	RIPADM with Bregman Regularization . . . . .	76
4.4.1	Preliminaries . . . . .	76
4.4.2	Algorithm . . . . .	78
4.4.3	Applications . . . . .	81
<b>5</b>	<b>Preliminaries on economic equilibrium model</b>	<b>89</b>
5.1	Introduction . . . . .	89
5.2	Walrasian function . . . . .	90
<b>6</b>	<b>Computational experiences on utility maximization problems</b>	<b>95</b>
6.1	Methods for solving the agent problem . . . . .	95
6.1.1	Primal-dual interior-point method . . . . .	97
6.1.2	Gradient projection with acceleration . . . . .	98
6.2	Numerical experiments . . . . .	104
6.2.1	Constant elasticity of substitution utility function . . . . .	104
6.2.2	Cobb-Douglas utility function . . . . .	107
	<b>Conclusions and future works</b>	<b>109</b>
	<b>Bibliography</b>	<b>117</b>