

# Decisiones Robustas en la Producción Agrícola

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UNIVERSIDAD  
**AUSTRAL**



- Investigación:
  - Quiénes somos
  - Para qué nos juntamos
  - Qué hicimos
- El modelo general de decisión agrícola
- Métodos Tradicionales: Optimización con Algoritmos Genéticos
- Decisiones Robustas aplicadas al Agro
  - Metodología
  - Agregación de datos y PCA.
  - Estrategias adaptativas
  - Multiobjetivo
  - Syngenta Crop Challenge
- Decisiones Robustas aplicadas al Merval
- Otros Proyectos

# Quienes somos



Horacio Rojo, Silvia Ramos, Darío Kalmus, Alejandro Wainstock, German Gual, Federico Rodríguez, Pedro Tolón, Pamela Strusiat, Alejandra Castellini, Juan Manuel Cacace, Matías Elietz



Carmen Vicién, Rita Marra, Cristina Ras, Fernanda Zalazar, Federico Bert, Guillermo Podestá





## Modelar Decisiones de Planificación Agrícola

- Decisión: qué cultivar?
- Considerando Incertidumbre climática y económica
- Considerando perfil psicológico
- Normativo: manejar la incertidumbre
- Descriptivo: estimar patrones de uso de la tierra



## Por que es importante?

- Gran Impacto micro, macro-económico y ambiental (180M USD/año)
- Asociado con: Cambio Climático, Disponibilidad de alimentos, BIO Combustibles, BIG DATA





# Qué hicimos

- 2 proyectos UBACYT acreditados y un proyecto PICT
- Más de 40 reuniones de trabajo interdisciplinarias
- Más de 20 presentaciones en Congresos Nacionales e Internacionales
- Viajamos al interior del país, Uruguay, Ecuador, Chile, México.





# Decisiones de Producción Agrícola



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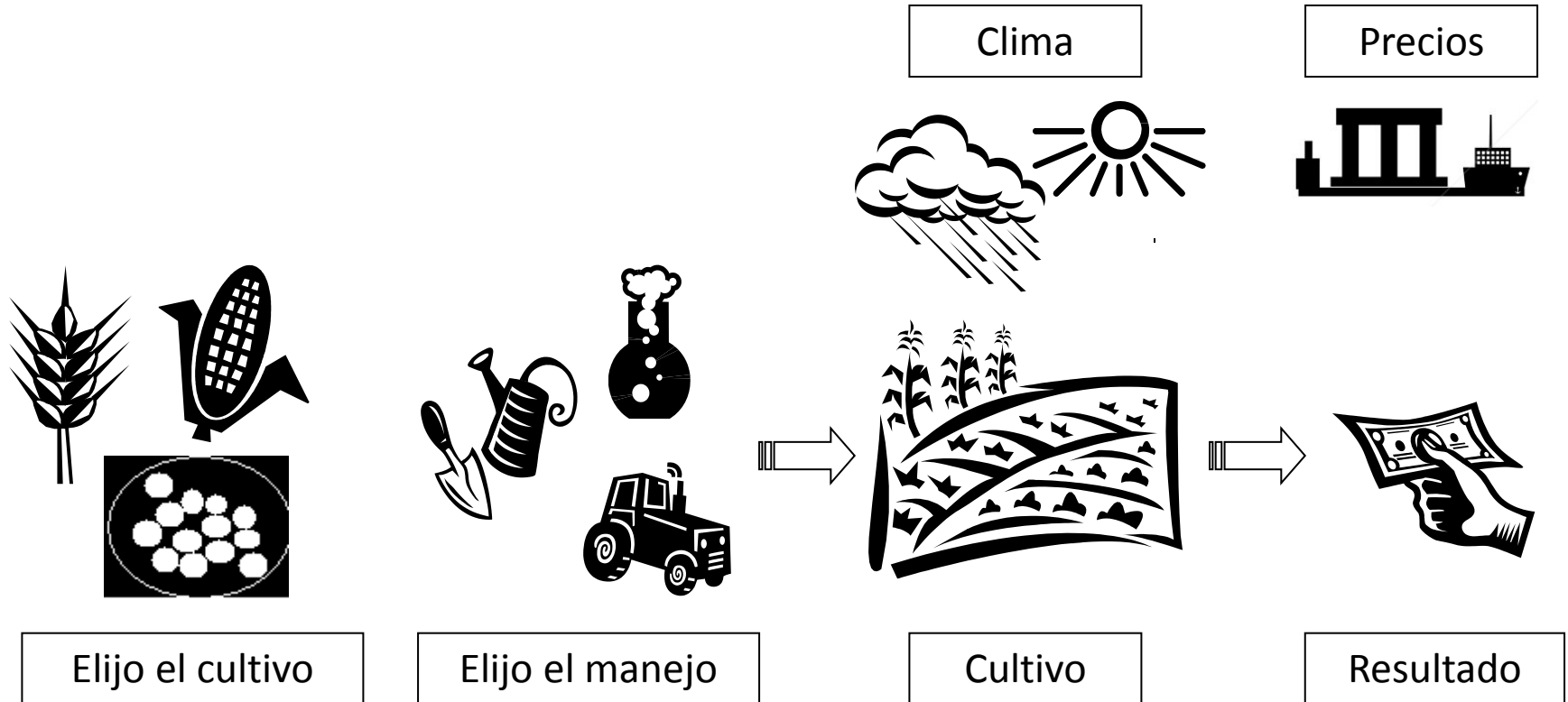
INGENIERÍA



FACULTAD  
DE INGENIERÍA  
Universidad de Buenos Aires

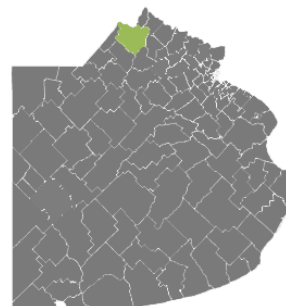


# El modelo





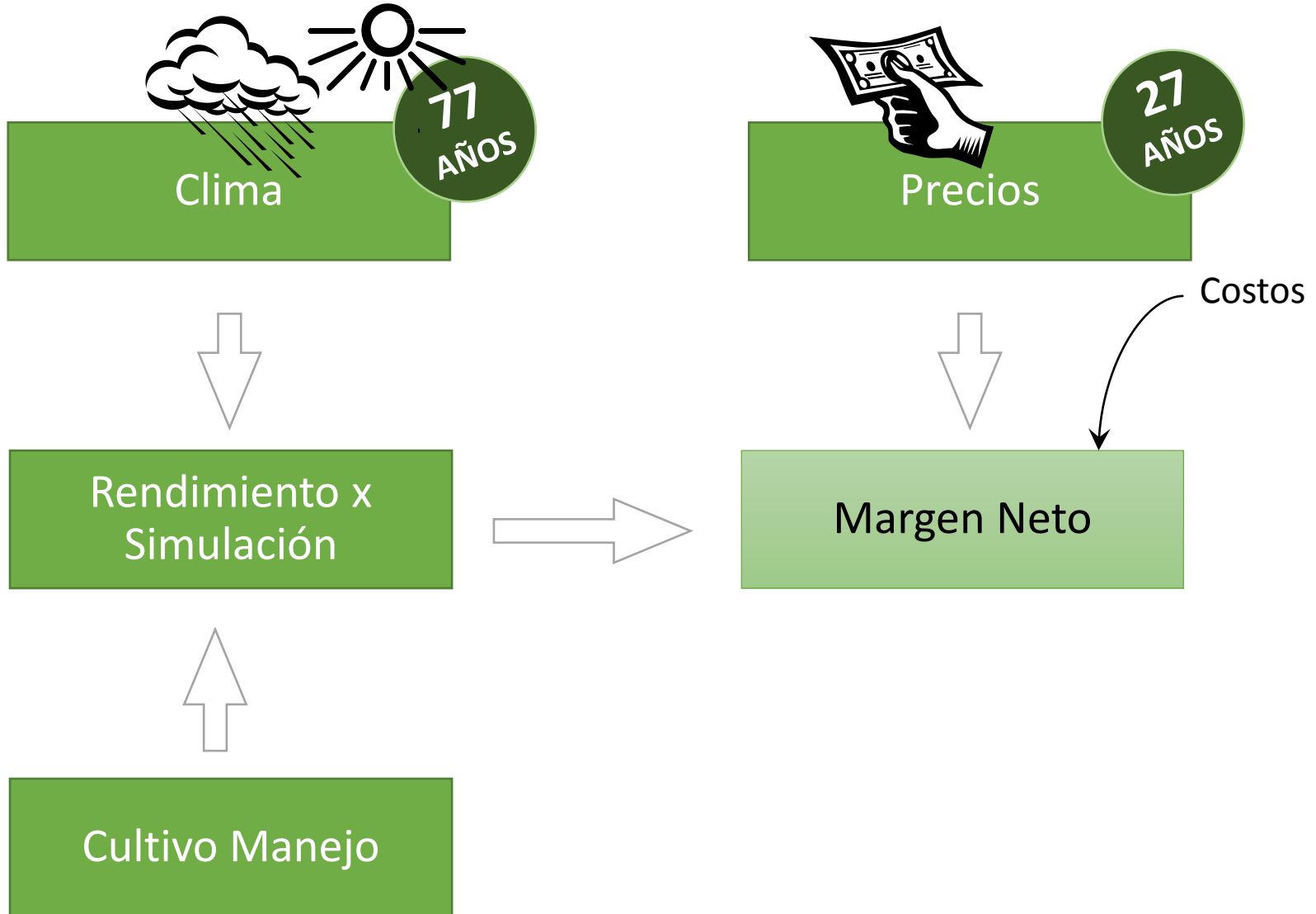
# El modelo: ESTRATEGIAS



- Una zona  
Pergamino, Buenos Aires
- Una temporada  
Septiembre a mayo
- Decisiones a nivel individual  
1 productor, 600 Ha
- 6 Cultivos-manejos tabla
- Continuas  
definidas por  $x_i / \sum x_i = 1$
- Discretas  
terreno divisible en 6 subparcelas

	Genotipo	Fecha Siembra	N Adic. (kg ha-1)	Densidad Siembra (pl m <sup>-2</sup> )	ID
maíz	DK682	15-Sep	100	8	Ma1
		15-Oct	60	6,5	Ma2
soja	DM3700	15-Oct			Soy1
	DM4800	25-Nov			Soy2
	WHEAT			SOY	
trigo soja	D. Enrique	01-Jul	40	Genotipo: DM4800 20 días Trigo	WS1
	Guapo	01-Jun	80		WS2

# El modelo: ESCENARIOS





## Métodos Tradicionales

- Modelan la incertidumbre con una función de densidad de una Variable Aleatoria
- Maximizan el valor esperado de una métrica asociada a (\$) -> **estrategia optima**
- Diferentes métodos para Optimizar: PL, Heurísticos, etc.
- Se puede hacer un Análisis de Sensibilidad

## Robust Decision Making (RDM)

- Cuando hay mucha incertidumbre, se incorpora Simulando Escenarios
- Expiración mediante Algoritmos de Data Mining Clasificación -> **estrategias robustas**
- Invierte el Análisis de Sensibilidad

## Modelo General de Inversión

- Prospect ( $w_i, p_i$ )
- Ejemplo A vs. B

$$\text{A} \left\{ \begin{array}{l} \$1000 \quad p=0.5 \\ \$200 \quad p=0.5 \end{array} \right.$$

$$\text{B} \left\{ \begin{array}{l} \$1800 \quad p=0.6 \\ \$-200 \quad p=0.4 \end{array} \right.$$

- Teorías que explican/recomiendan:

Expected Utility, Prospect Theory, Regret Theory, Markowitz, VAR, CVAR, Omega ratio.

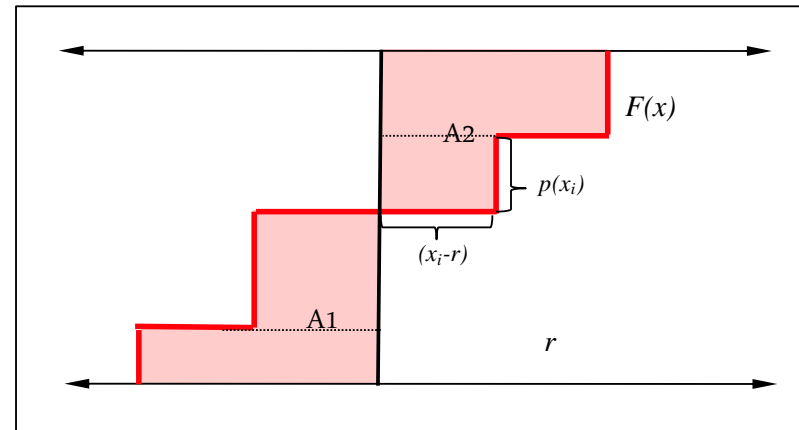
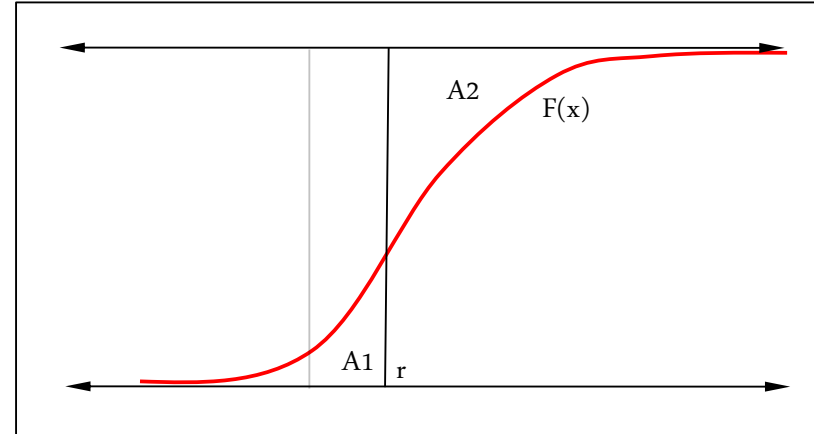


## Omega

Métrica de performance de una distribución de resultados

$$\Omega(r) = \frac{\int_r^b 1 - F(x) dx}{\int_a^r F(x) dx}$$

$$\Omega(r) = \frac{\sum_{i:r < x_i} (x_i - r) \cdot p(x_i)}{\sum_{j:x_j < r} (r - x_j) \cdot p(x_j)}$$



r: Umbral de ganancia- Parámetro del decisor

## Modelo

- Margen Neto Cultivo Manejo (CM)  $j$  año  $i$ .  $\pi_{ij}$

$$\pi_{ij} = Y_{ij} \cdot P_j - (F_j + V_{ij} + S_i + T_i)$$

$Y_{ij}$  rendimientos simulados ;  $P_j$  Precios;  $F, V, S, T$  Costos e Impuestos

- $x_j$  Proporción de terreno asignado con el CM  $j$   $\sum_{j=1}^m x_j \leq 1$

- Dada  $x_j$ , el Margen Neto  $\pi_i$  es  $\pi_i = \sum_{j=1}^m x_j \pi_{ij}$

- Objetivo a maximizar: Omega Ratio  $\Omega_{\max}(r) [\pi_i]$



## Representación

- vector de 100 elementos

XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX  
XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX

- $X \text{ int}(1,20)$  representa la asignación en el 1% del terreno.

- Ordenados de menor a mayor

- Ejemplo:

22222 22222 22222 22222 22222 22222 22222 22222 66666 66666 66666  
66666 66666 66666 66666 66666 66666 66666 66666 66666

representa 40% Ma2 y 60% Soy1

## Operadores

22222 22222 22222 22222 22222 22222 22222 22222 66666 66666 66666  
66666 66666 66666 66666 66666 66666 66666 66666 66666

- ADJACENT MUTATION

22222 22222 22222 22222 22222 22222 22222 22222 **2**66666 66666 66666  
66666 66666 66666 66666 66666 66666 66666 66666 66666

- COMPLEMENTARY MUTATION

22222 22222 22222 22222 22222 22222 22222 22222 **22222 22222 22222**  
**22222** 66666 66666 66666 66666 66666 66666 66666 66666

- SIMPLE MUTATION

- INTRINSIC MUTATION

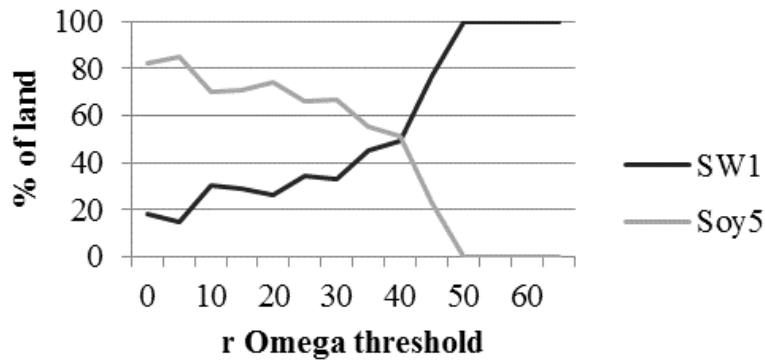
- CROSSING OVER

- CLONING

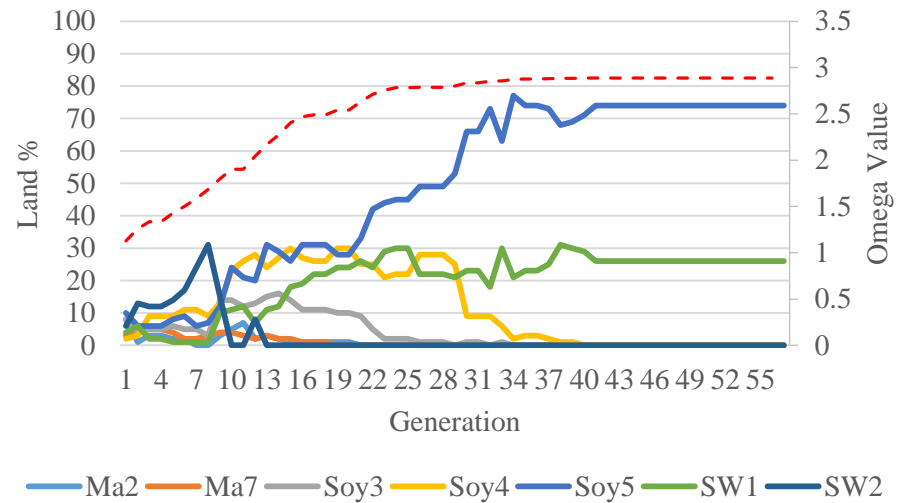


## Resultados

### Optimal Crop Mix



### Algorithm efficiency



## Publicaciones

Value of perfect ENSO phase predictions for agriculture: evaluating the impact of land tenure and decision objectives.

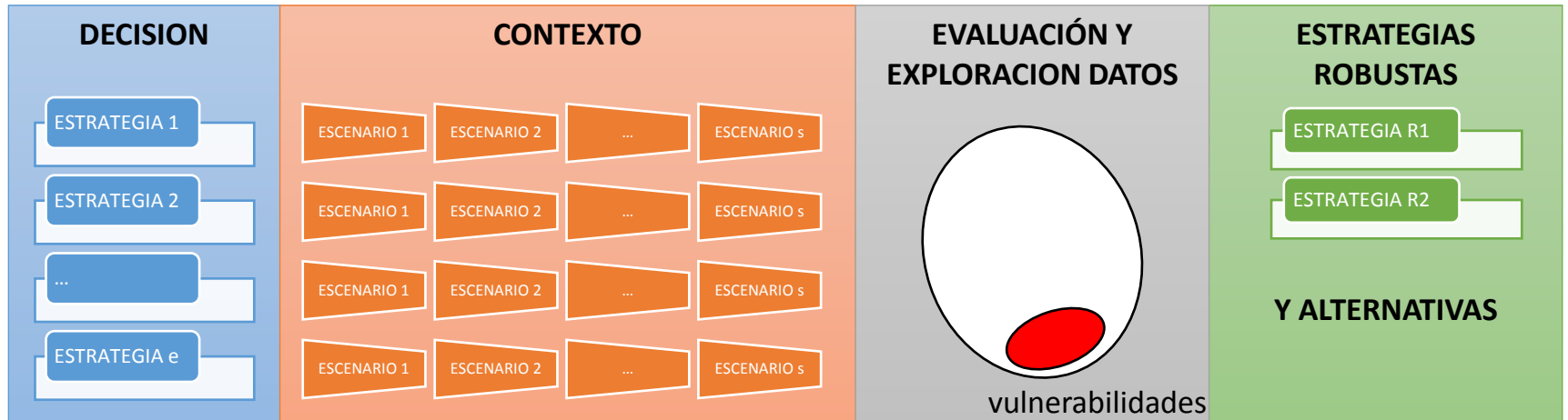
**Climatic Change: Volume 97, Issue 1 (2009), Page 145.**

Objective functions in agricultural decision-making: A comparison of the effects of expected utility, regret-adjusted expected utility, and prospect theory maximization: **Working Papers Series, Paper WP-06-01, Columbia University.**

Solving an agricultural investment decision model using genetic algorithms.

**III ALIO/EURO Workshop on Applied Combinatorial Optimization. December 8 - 10, 2014. Montevideo, Uruguay.**

# Decisiones Robustas: PASOS



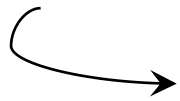
# Decisiones Robustas: EVALUACION

ESCAMARIOS →

ESTRATEGIAS ↓

	F1	F2	...	F2079
S1				
S2				
...				
S462				

Margen



$$\text{Regret}_{ij} = \text{MAX}(\text{Margen}_j) - \text{Margen}_{ij}$$



ESCAMARIOS →

ESTRATEGIAS ↓

	F1	F2	...	F2079
S1				
S2				
...				
S462				

Regret

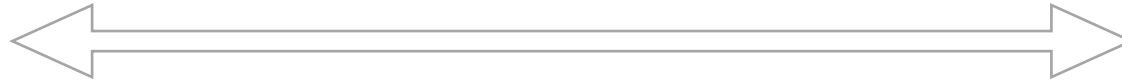


# Decisiones Robustas: EVALUACION



+ CONSERVADOR

- CONSERVADOR



Máximo regret

MIN



**E159**

Regret 3º cuartil

MIN

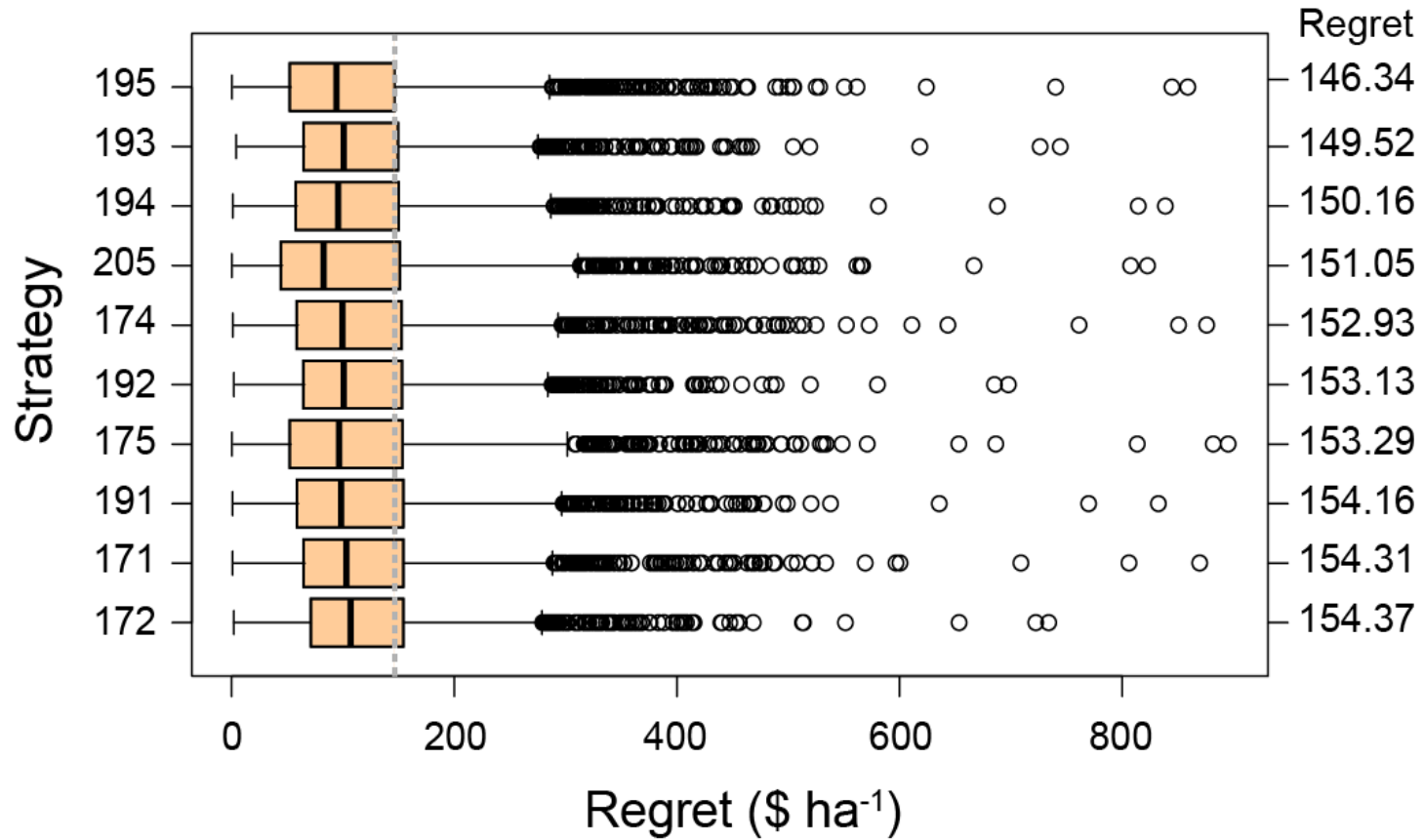


**E195**

Ma4	Ma5	So1	So6	SW1	SW6
0	3/6	0	1/6	2/6	0

Ma4	Ma5	So1	So6	SW1	SW6
0	0	0	3/6	3/6	0

# DR: CANDIDATA INICIAL



# DR: VULNERABILIDADES

ESCENARIOS →

ESTRATEGIAS

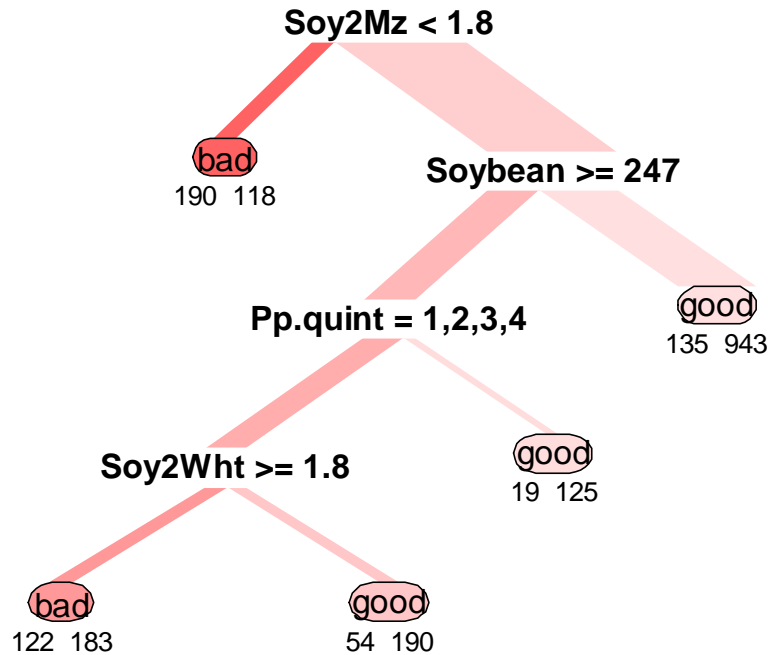
	F1	F2	F3	F...	F207 9
S1	<b>Regret</b>				
...					
195 candidata	Good	Good	Bad	...	Good
S462					

Caracterizo los ESCENARIOS

	PSoy	PMa	PW	Rains	Soy2Ma	Ma2We	We2Soy	Score
F1								Good
F2								Good
F1								Bad
								...
F207 9								Good

**Algoritmo de clasificación**

# Decisiones Robustas: DECISION TREE

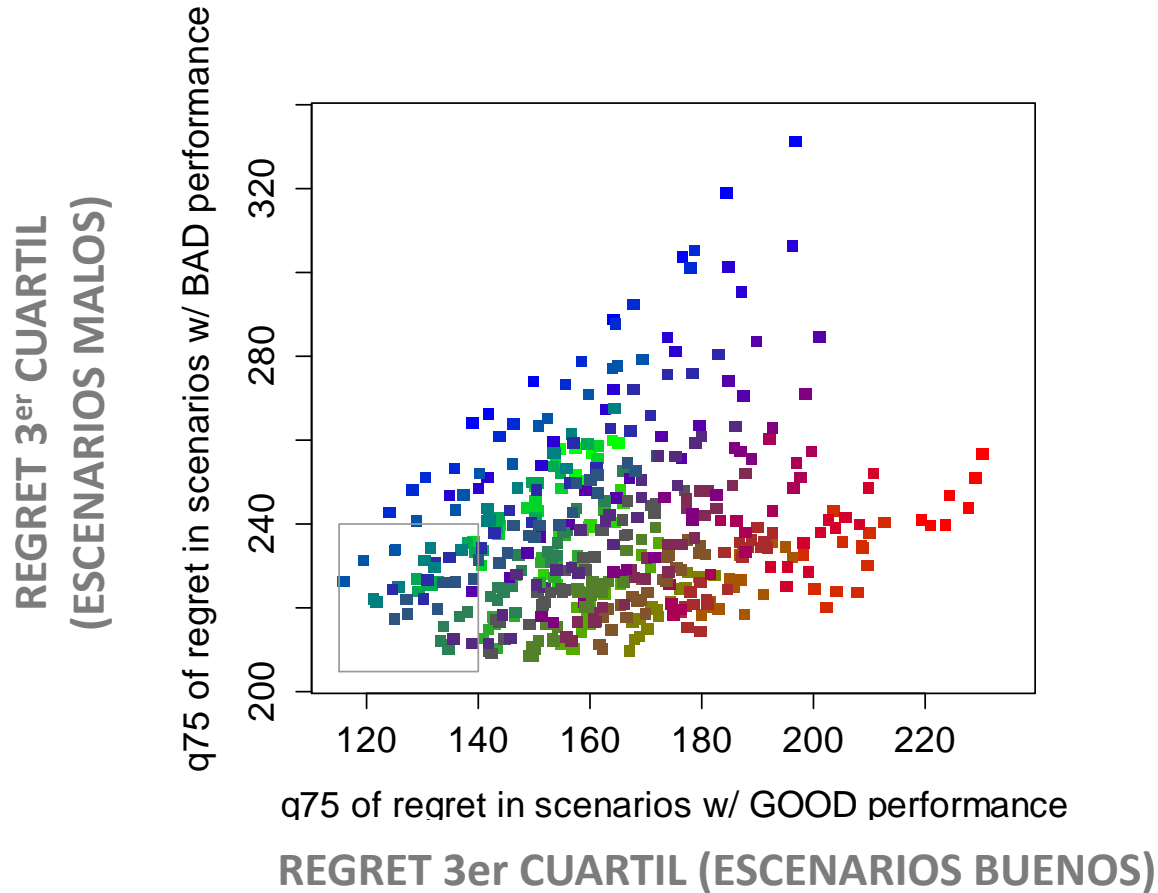


		Simulado		
		Bad	Good	Sum
Predicho	Bad	312	301	613
	Good	208	1258	1466
	Sum	520	1559	2079

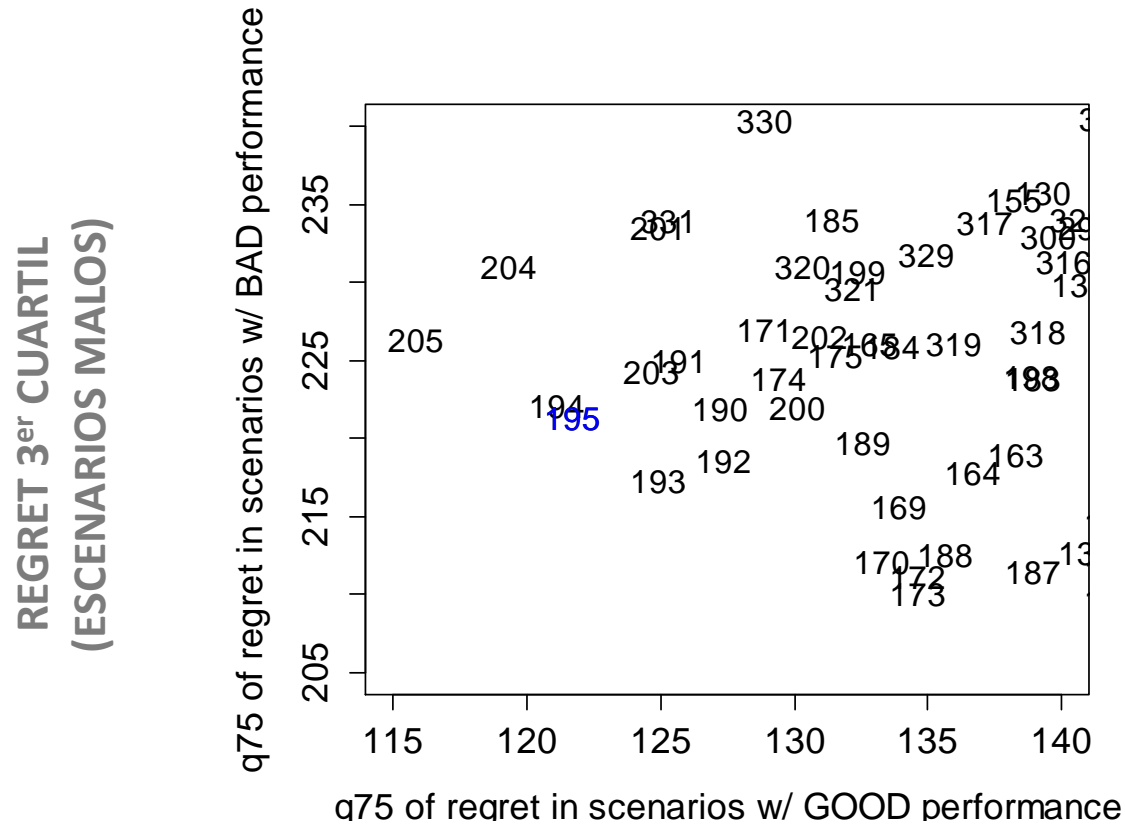
**ERR = 24,4%**



# Decisiones Robustas: ALTERNATIVAS



# Decisiones Robustas: ALTERNATIVAS

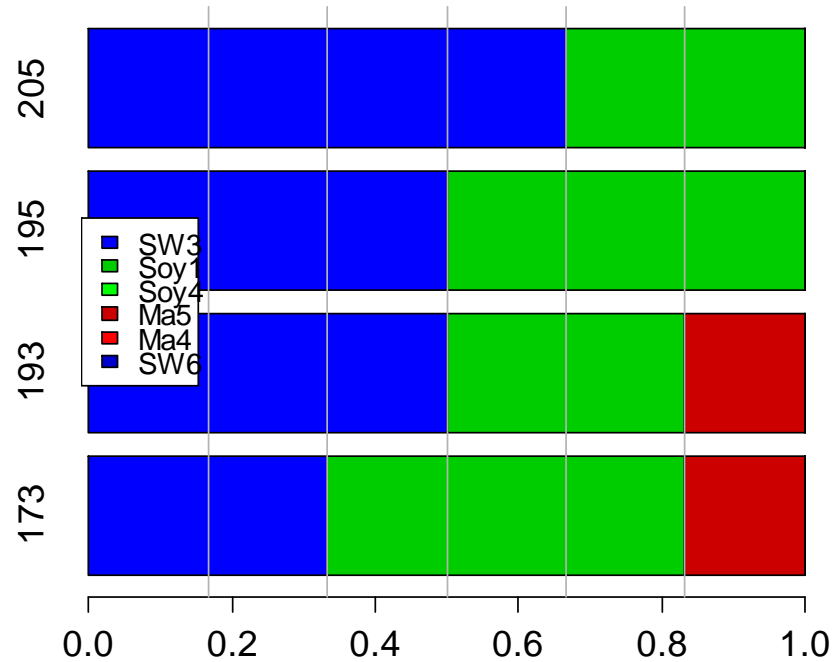


REGRET 3<sup>er</sup> CUARTIL (ESCENARIOS BUENOS)

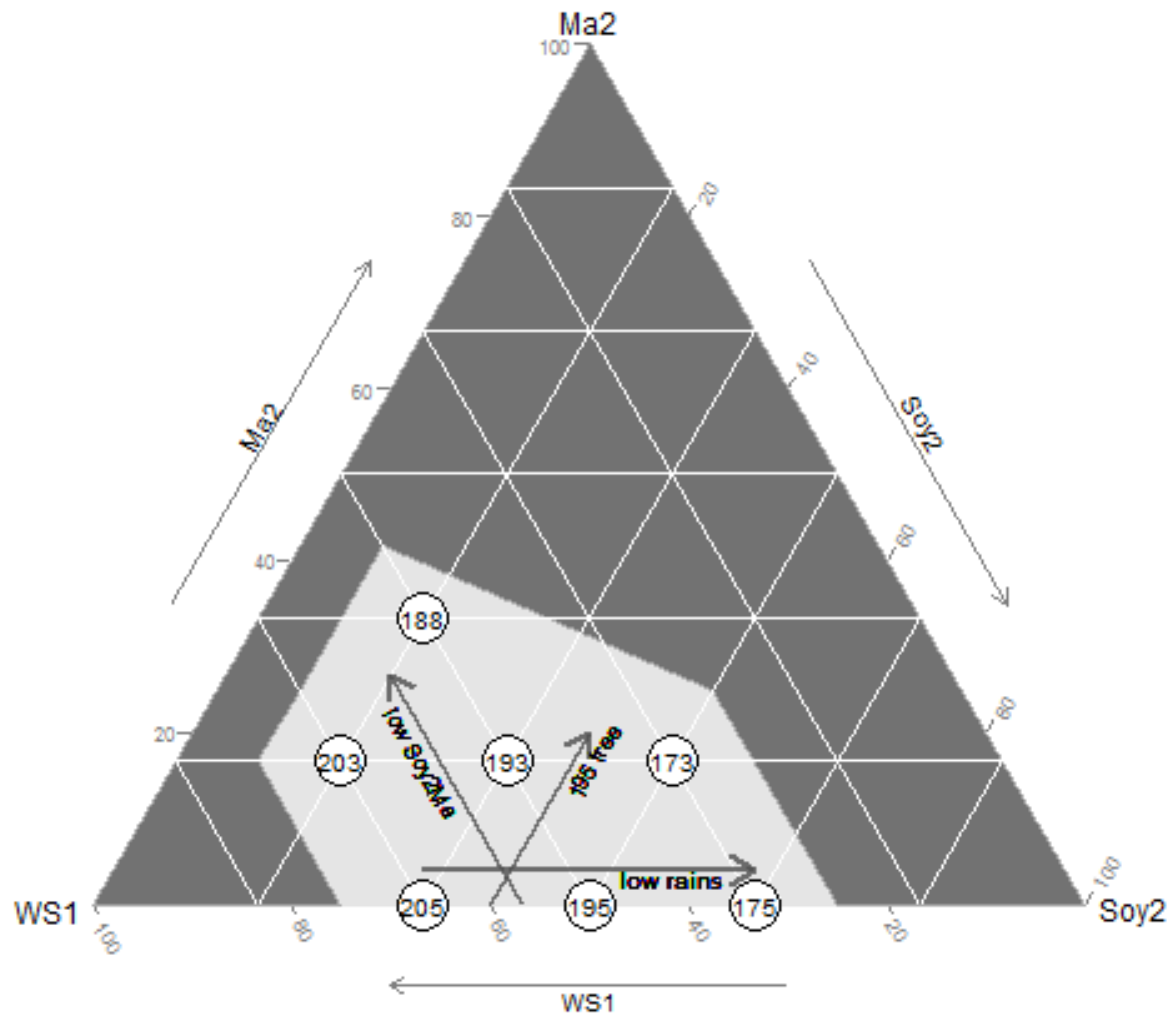
## FRONTERA DE DECISIÓN

Land allocation

ESTRATEGIA



# Decisiones Robustas: ALTERNATIVAS





# DR: AGREGACION DE DATOS Y PCA

Datos diarios

- Tmax
- Tmin
- Precipitaciones
- Radiación solar



Input FAUBA

Datos agregados

	Tmax		Tmin		Precipitaciones		Rad
	MAX	MED	MIN	MED	SUMA	DÍAS SIN	MED
All season	✓	✓	✓	✓	✓	✓	✓
Sep-Oct	✓	✓	✓	✓	✓	✓	✓
Nov-Ene	✓	✓	✓	✓	✓	✓	
Feb-May	✓	✓	✓	✓		✓	

# DR: AGREGACION DE DATOS Y PCA



Datos agregados



Componentes Principales



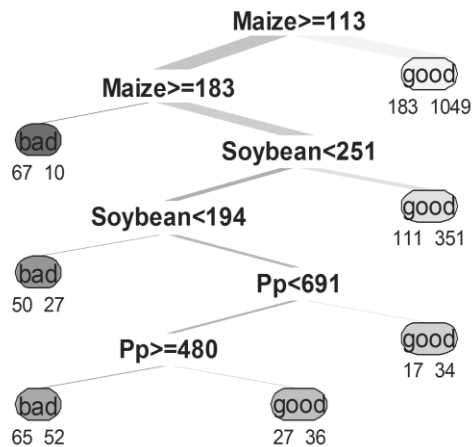
Clasificación

	Comp.24	Comp.23	Comp.5
RainSeason			0.107
dwrSeason			0.126
dwrSepOct			-0.295
dwrNovEne			-0.101
dwrFebMay			0.931
tmaxSeason	-0.102		
tmaxNovEne		-0.112	
tmaxMedSeason	-0.679	-0.108	
tmaxMedNovEne	0.218	0.583	
tmaxMedFebMay	0.38	-0.342	
tminNovEne		0.122	
tminFebMay		-0.123	
tminMedSeason	-0.503		
tminMedSepOct		0.123	
tminMedNovEne	0.171	-0.536	
tminMedFebMay	0.148	0.384	

# DR: AGREGACION DE DATOS Y PCA

## Var. originales

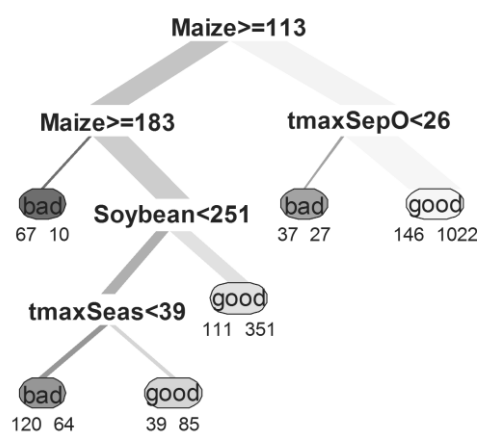
4 variables



Error 20,5%

## Datos agregados

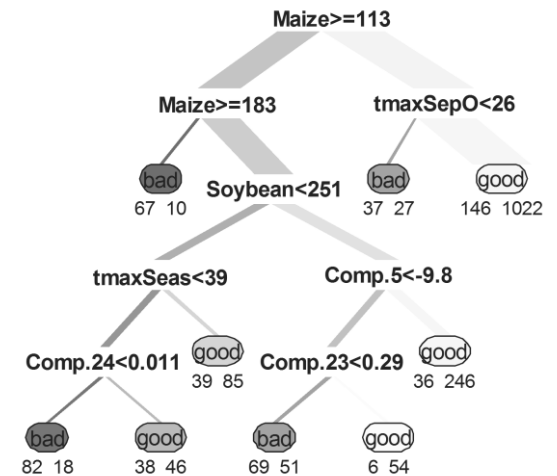
29 variables



Error 19,1%

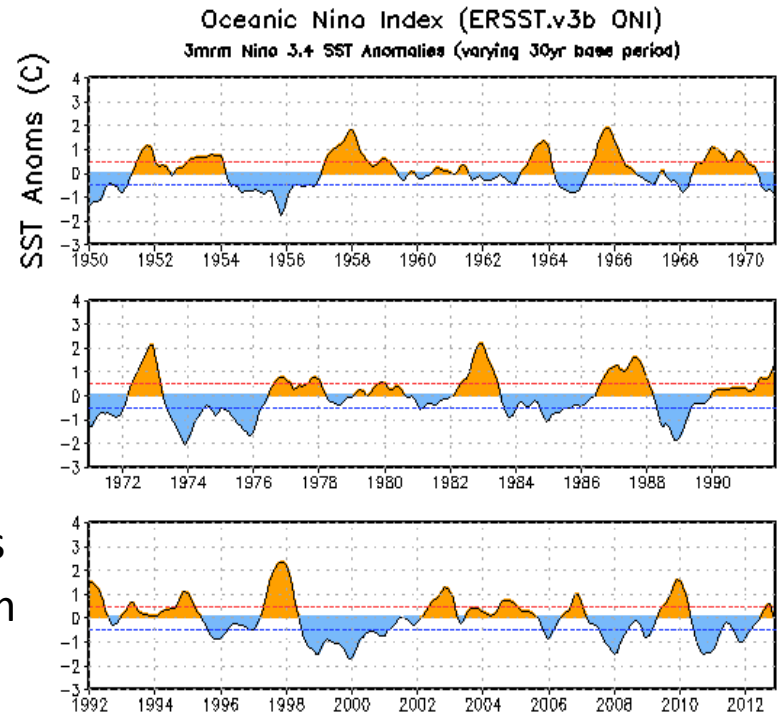
## Comp. principales

60 variables

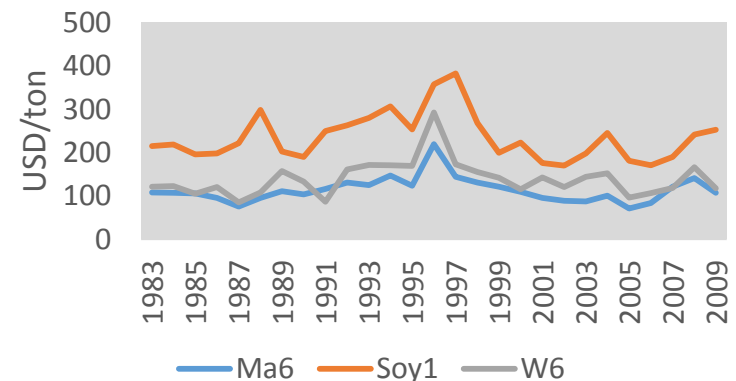


Error 17,8%

- ¿por qué? -> Aprendizaje
- Estrategias:
  - Asignación Inicial
  - Lógica para el corregir
- Escenarios:
  - Considera dos años consecutivos de precios
  - Los combina con dos años consecutivos clim
  - Agrega variables
- Caracterización de escenarios:
  - PPs totales en los dos años
  - PPs promedio, máximas y mínimas
  - Precios promedio, máximos y mínimos



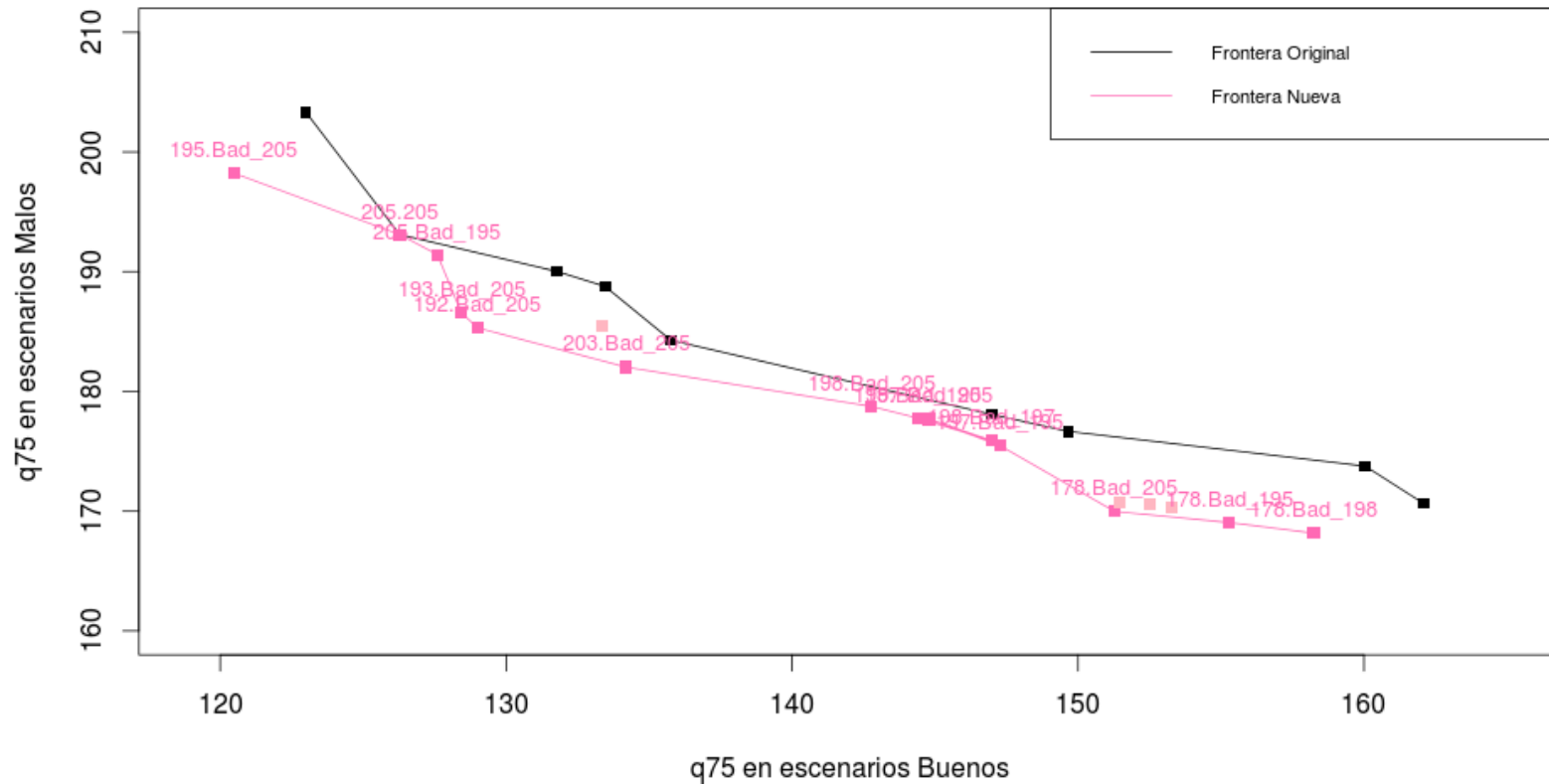
Precios de cultivos



# DR: ESTRATEGIAS ADAPTATIVAS



### Nueva Frontera de Decisión





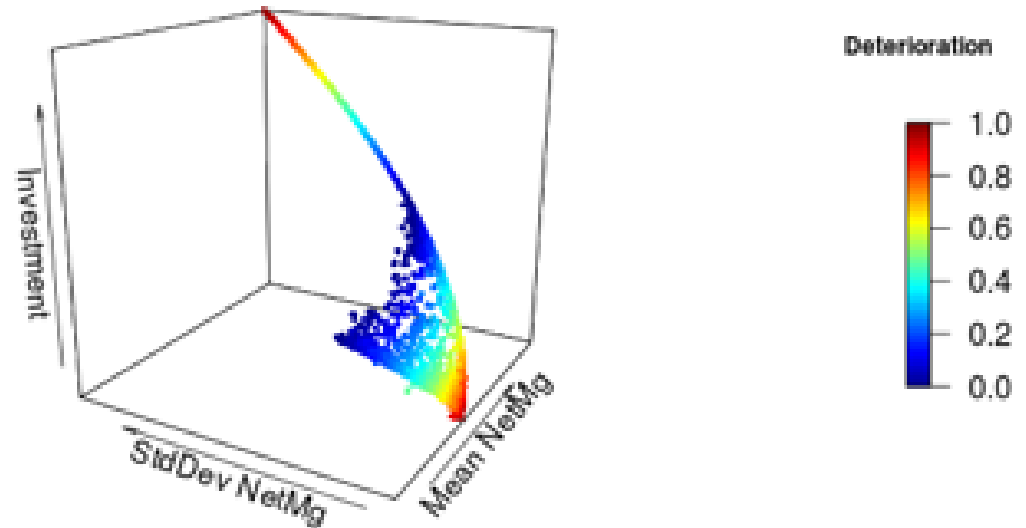
- **Objetivos**

- Media del margen neto
- Desvío del margen neto
- Inversión inicial
- Rotación de cultivos

- **Escenarios:**

- Exploración
- Frontera de Pareto
- Trade-off

**Pareto Front - Objectives**





- ¿Which is the best crop mix of soybean varieties?
- Zone: mid-west US
- DATASETS
  - Tests Variety-Location
  - Location
    - Soil
    - Daily Climate
- CRITERIA
  - Methodology
  - Actual Yields

# DR: SYNGENTA CROP CHALLENGE



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Universidad de Buenos Aires

## Microsoft AZURE Machine Learning Studio

- Free license (lite version), versatile, 'Big Data', Parallel computing

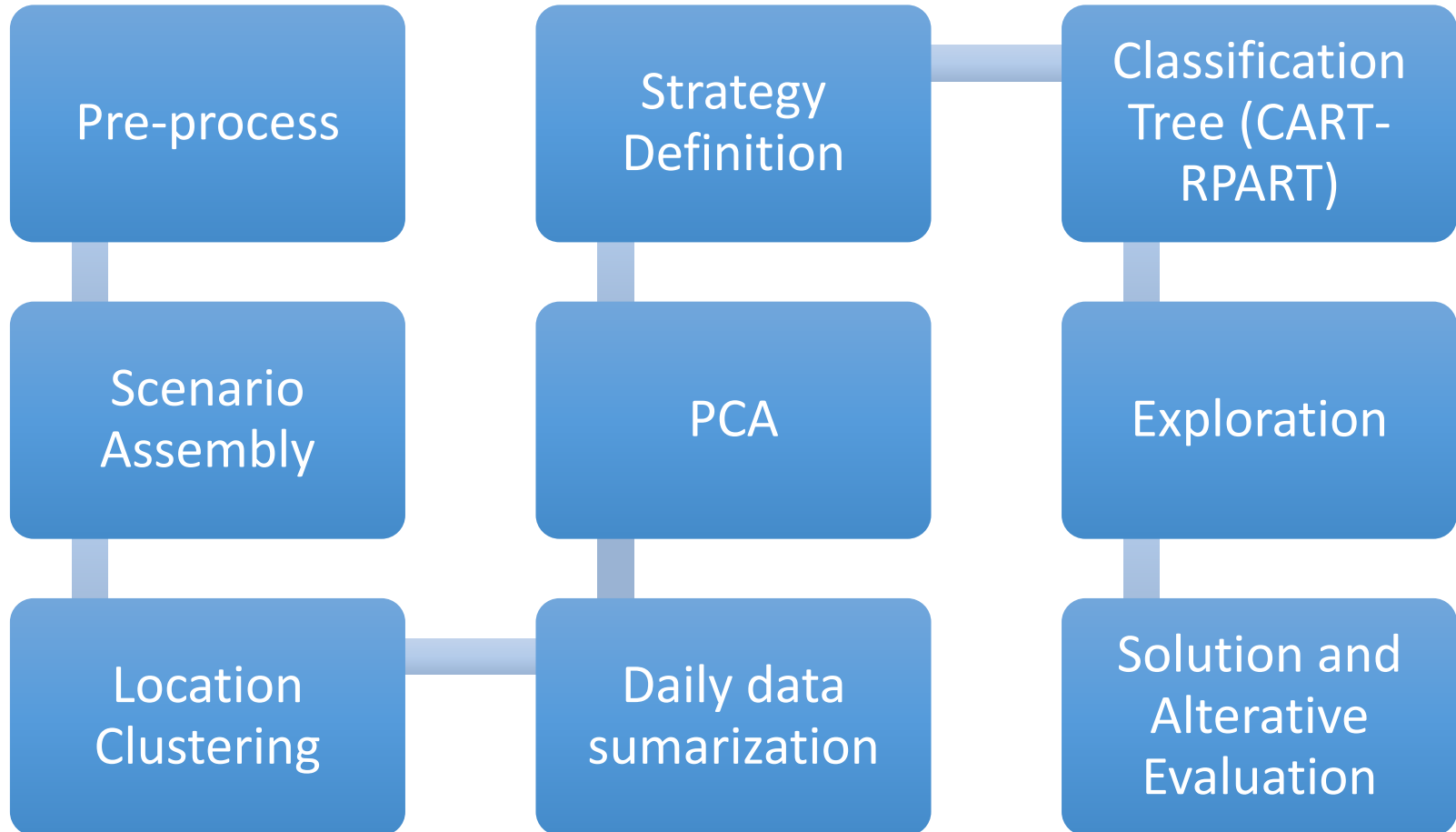
The screenshot displays the Microsoft Azure Machine Learning Studio interface. The main workspace is titled "Create R Model" and is in "In draft" status. The workflow consists of several interconnected modules: "Breast cancer data" (input), "Split Data", "Create R Model" (highlighted with a blue box and a circled '1'), "Train Model", "Score Model", and "Execute Python Script". A "Mini Map" in the bottom-left corner provides a smaller view of the entire workflow. On the right side, the "Properties" pane shows the "Trainer R script" for the "Create R Model" module, containing the following R code:

```
1 # Input: dataset
2 # Output: model
3
4 # The code below is an example which can be r
5 # See the help page of "Create R Model" modul
6
7 library(e1071)
8 features <- get.feature.columns(dataset)
9 labels <- as.factor(get.label.column(datas
10 train.data <- data.frame(features, labels)
11 feature.names <- get.feature.column.names(dat
12 names(train.data) <- c(feature.names, "Class"
13 model <- naiveBayes(Class ~ ., train.data)
14
```

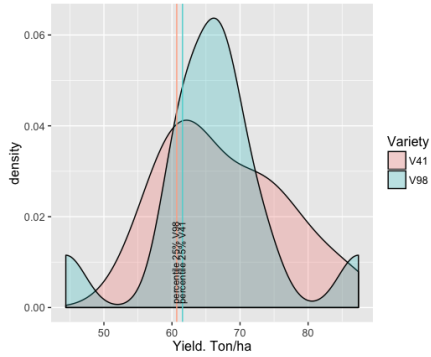
Below the code, the "Quick Help" section states: "Creates an R model using custom resources (more help...)". The bottom of the interface features a dark navigation bar with icons for "NEW", "RUN HISTORY", "SAVE", "SAVE AS", "DISCARD CHANGES", "RUN", "SET UP WEB SERVICE", and "PUBLISH TO GALLERY".

# DR: SYNGENTA CROP CHALLENGE

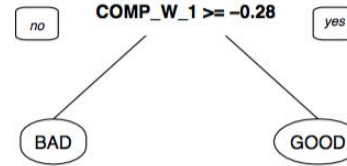
## Implementation



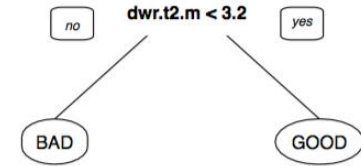
# DR: SYNGENTA CROP CHALLENGE



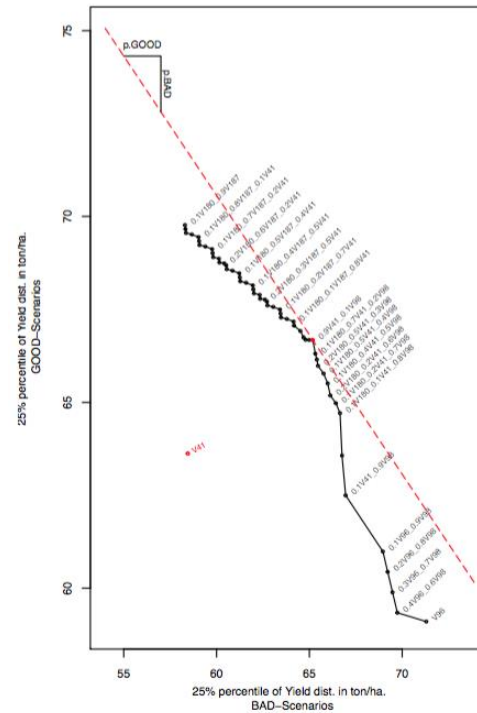
Scenario Classification considering V41



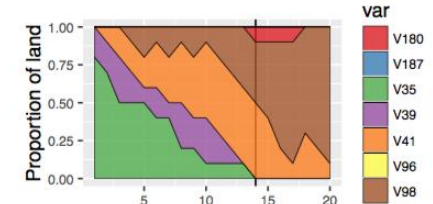
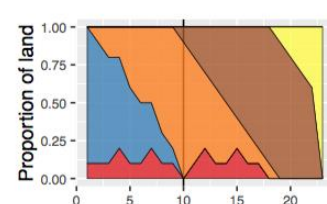
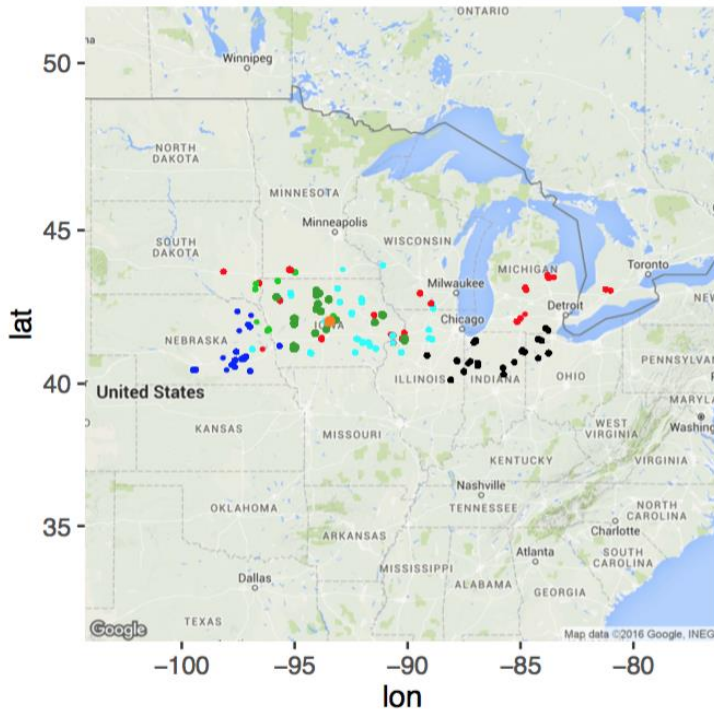
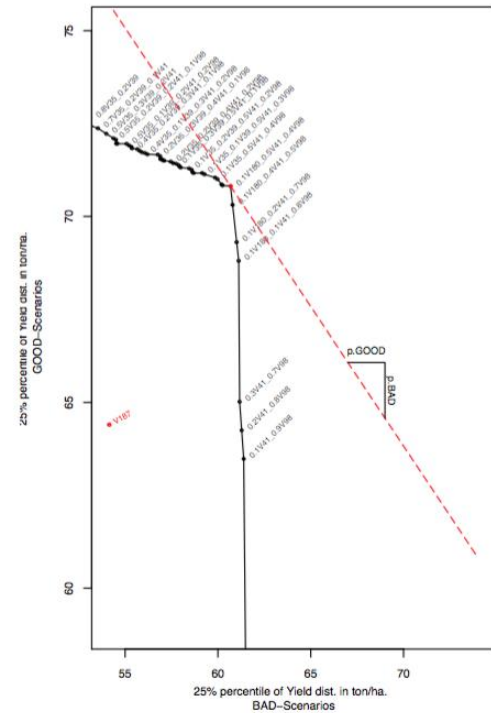
Scenario Classification considering V187



Trade-off alternatives



Trade-off alternatives



# DR: MODELO PARA EL MERVAL

## DECISION

- Acciones del Merval
- Opción de no invertir
- Hasta un total de 4 títulos diferentes.
- Horizonte: 1 mes

**2380 Estrategias**

## CONTEXTO

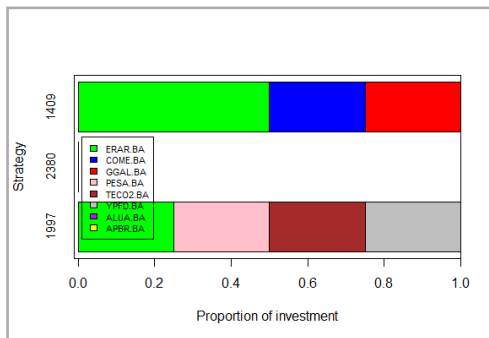
- Escenarios: meses históricos del 2010 al presente
- Caracterizados por USD, IPC, USD\_b, BRL y combinaciones

**61 Escenarios**

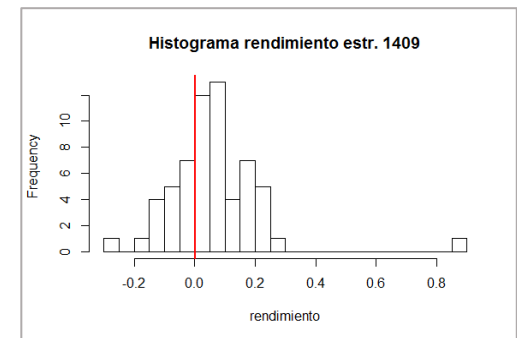
## EVALUACIÓN Y EXPLORACION DATOS

- Percentil 30% del rendimiento

**145180 Evaluaciones**



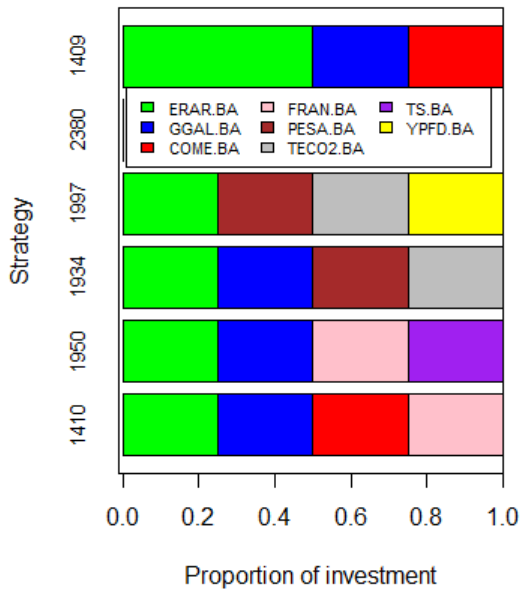
	e	s	rend
16466	8	2186	0.07110522
16467	8	2187	0.10266935
16468	8	2188	0.05925952
16469	8	2189	0.09082366
16470	8	2190	0.12238779
16471	8	2191	0.15194034
16472	8	2192	0.12015439
16473	8	2193	0.10830870





# DR: MODELO PARA EL MERVAL

Best strategies by quantile 30%



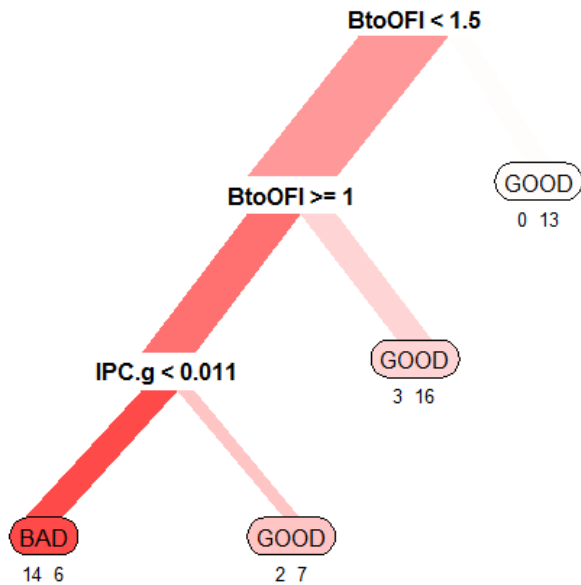
CANDIDATA

S	e	USD.g	BRL.g	IPC.g	USDB.g	BtoOFI	Target
1409	2	0.0090	-0.0499	0.0125	0.0104	1.0057	GOOD
1409	3	0.0040	-0.0169	0.0114	0.0129	1.0146	BAD
1409	4	0.0030	-0.0289	0.0083	-0.0102	1.0013	GOOD
1409	5	0.0073	0.0400	0.0075	0.0051	0.9991	GOOD
1409	6	0.0048	-0.0138	0.0073	0.0102	1.0045	GOOD
1409	7	0.0022	-0.0296	0.0080	0.0152	1.0175	GOOD
1409	8	0.0023	-0.0018	0.0074	0.0000	1.0152	GOOD
1409	9	0.0028	-0.0416	0.0072	0.0000	1.0124	BAD



ARBOL DE DECISION PARA  
IDENTIFICAR  
VULNERABILIDADES

# DR: MODELO PARA EL MERVAL



Estrategia 1409 es **GOOD** cuando:

- El blue se separa mucho del oficial > 1.5
- Cuando no había cepo del dólar. (blue≈ofi)

Estrategia 1409 es **BAD** cuando:

- No se cumple lo anterior y
- Los precios oficiales no se disparan.

		ACTUAL		
		BAD	GOOD	TOT
PRED	BAD	14	6	20
	GOOD	5	36	41
	TOT	19	42	61



USO CLASIFICACION  
PARA BUSCAR  
ALTERNATIVAS



## Publications

Decisiones robustas en la optimización de portafolio de acciones del Merval. [Robust Decisions in portfolio optimization in Buenos Aires Stock Market –MERVAL]  
**2nd meeting Quants Argentina. Universidad Abierta Interamericana. March 14, Buenos Aires, Argentina.**

Decisiones Robustas en la producción Agrícola. Plan de tesis de doctorado.  
**Escuela Latino Iberomericana de Investigación Operativa. February 23-27. Quito, Ecuador.**

Medición del impacto del monocultivo de soja en los rendimientos **Hackaton Agrodatos. October 25, 2014. Buenos Aires, Argentina.**

Decisiones Robustas en la Producción Agrícola en las Pampas Argentinas.  
**XVII Latin-Iberian-American Conference on Operations Research (CLAIO). October 6-10, 2014. Monterrey, Mexico.**

## Publications

“Big Data & Agro: opportunities, challenges and applications”. August 1, 2014.  
**Escuela de Ciencias de la Informática. ECI 2014 Departamento de Computación.  
Facultad de Ciencias Exactas y Naturales. Universidad de Buenos Aires.**

Metodología de Decisiones Robustas Aplicada a Sistemas Agropecuarios.  
Avance del Proyecto- Grupo GIDESA.

**12° Simposio Argentino de Investigación Operativa .September 1-5, 2014.  
Universidad de Palermo, Buenos Aires, Argentina.**

Análisis de Vulnerabilidades en una Metodología de Decisiones Robustas Aplicada a  
Sistemas Agrícolas .

**XXVII Encuentro Nacional de Docentes en Investigación Operativa (ENDIO) XXV  
Escuela de Perfeccionamiento en Investigación Operativa (EPIO)**

Una aplicación en R para Decisiones Robustas.

**Encuentro de usuarios de R de Argentina November 14-15, 2013. UAI. Bs As  
Argentina**

## Publications

Análisis de decisiones en la producción agrícola. Comparación entre metodologías.  
**VIII Jornadas Interdisciplinarias de Estudios Agrarios y Agroindustriales October 29-31, 2013. School of Economy, UBA. Buenos Aires, Argentina.**

Un Modelo de Decisiones Robustas en la Producción Agrícola en Pergamino. Proyecto Interdisciplinario. FIUBA-FAUBA  
**VI Taller Internacional “La Modelización en el sector agropecuario. September 25-26, 2014.**



## Federico Rodríguez

EVALUACIÓN Y SELECCIÓN DE ESTRATEGIAS ADAPTATIVAS ROBUSTAS EN LA PRODUCCIÓN AGRÍCOLA. Aprobado Mayo 2015. Nota: 10



## **Juan Manuel Cacace**

TOMA DE DECISIONES ROBUSTAS CON MULTIOBJETIVOS APLICADOS A LA PRODUCCIÓN AGRÍCOLA. Mayo 2016. Nota: 10

## **Matías Elietz**

APLICACIÓN DE LAS DECISIONES ROBUSTAS AL BALANCE DE PORTAFOLIO DE ACCIONES EN EL MERVAL. Mayo 2016. Nota: 10

## **Pamela Strusiat**

LÓGICA DIFUSA EN MODELOS AGROPECUARIOS

## **Nicolás García Vozzi**

COMPARACION DE METODOS DR VS. INFO GAP

## **Alejandro Wainstock**

EVALUACIÓN DE ESTRATEGIAS CONTEMPLANDO EL FLUJO DE FONDOS

# Se aceptan colaboraciones...

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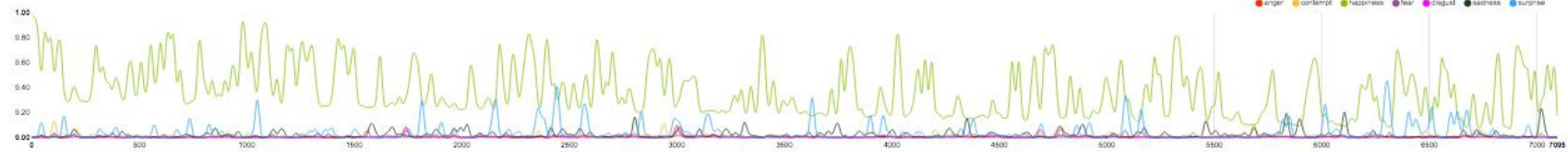
## OTROS PROYECTOS...

# Debate in E-motion. Devfest 2016 NYC

DEBATEINEMOTION · DEMOCRATIC PRESIDENTIAL DEBATE · FEB 4TH., 2016

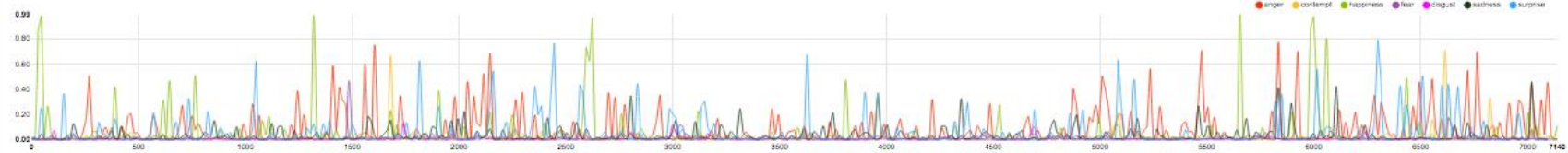
## Facial Emotion in Time

### Hillary Clinton



Pick a specific time from Hillary Clinton Timeline: 2745

### Bernie Sanders



Pick a specific time from Bernie Sanders Timeline: 0

## Image



### Hillary Clinton

I will look into it. I don't know the status, but I will certainly look into it. But, I can only repeat what is the fact that I spoke to a lot of different groups with a lot of different constituents, a lot of different kinds of members about issues that had to do with world affairs. I probably described more times than I can remember how stressful it was advising the President about going after Bin Laden. I want to go after the pharmaceutical companies like Valeant, and Turns that are increasing prices without any regard to the impact on people's health. Now, if all we're going to talk about is one part of our economy, and indeed one streak in our economy, we're missing the big oil companies. We're missing other big energy companies. We're missing the big picture, and I have a record of trying to go at the problems that actually exist, and I will continue to do that.

## Entities

Entity Bin Laden  
Sentiment negative  
Score -0.833388

Entity President  
Sentiment negative  
Score -0.833388

Entity oil companies  
Sentiment negative  
Score -0.702964

Entity energy companies  
Sentiment negative  
Score -0.739354

Entity pharmaceutical companies  
Sentiment negative  
Score -0.227646

Entity Valeant  
Sentiment negative  
Score -0.227646

## Newsroom

Filtering results for Kingston, ON, Canada

Filter by Relevance:



### SpaceX Launches Satellite, but Fails to Land Rocket on Barge

CAPE CANAVERAL, Fla. (AP) — SpaceX has another launch under its belt, but not another rocket landing. The leftover first-stage booster hit the floating platform hard Friday, said SpaceX chief Elon Musk. The company never expected to nail this landing, he said, because of the faster speed of the booster that was required to deliver the satellite to an extra-high orbit.

Relevance:



### Dan Aykroyd starts 'Blues Brothers' record label

LOS ANGELES (AP) — Dan Aykroyd says he's going to fulfill the true "mission from God:" finding and developing emerging blues players. That's why he's starting Blues Brothers Records with the widow of John Belushi. The label will have distribution and artist support through Blue Note Records. Aykroyd says American music started with the blues and "now it is in the hands of the next generation."

Relevance:



### Afghan family convicted of murdering 4 relatives in Canadian honor killing case

KINGSTON, Ontario (AP) - A Canadian jury on Sunday found three members of an Afghan family guilty of killing three teenage sisters and another woman in what the judge described as "cold-blooded, shameful murders" resulting from a "twisted concept of honor." The jury found Mohammad Shafia, 58; his wife Tooba Yahya, 42; and their son Hamed, 21, each guilty of four counts of first-degree murder, which carries an automatic life sentence.

Relevance:



The screenshot displays the PA EXPLORE website interface, which is a location-based news discovery tool. The main view features a map of the Manchester region with several location pins. A red circle highlights a specific area around Burnage, where a pop-up window shows a photo of Liam Gallagher and a text snippet: "Liam Gallagher on begging Jamie Oliver for bacon rolls, running 7 miles a day and releasing new music". Below the photo, it says "Mentioned: Liam Gallagher (birthPlaceOf) Burnage".

On the left side, there is a sidebar with search and filter options:

- Search:** A search bar with a magnifying glass icon.
- Place:** A section with a "Mentioned" checkbox checked.
- Person Facets:** Checkboxes for "Alumni Of", "MP Of", "Resident Of", and "Birth Place Of".
- Services:** Checkboxes for "Real Life", "Motoring", "News", "Snappa", and "Sport".
- Date Range:** A dropdown menu currently set to "Last Week".

At the bottom of the sidebar, there are links for "Privacy Policy", "User Guide", "JSON", "ATOM", and "RSS".

The main content area on the right shows a list of article snippets:

- Article 1:** "Liam Gallagher on begging Jamie Oliver for bacon rolls, running 7 miles a day and releasing new music".  
By Lucy Mapstone  
12.24 - 23 Aug 2016  
Liam Gallagher holding back in an interview would be like the Queen deciding not to show off her royal wave to passers-by.  
And the former Oasis singer has – as expected – let loose in a chat with Q magazine. In what is his first interview in a long while.  
Of course, he goes in hard on his
- Article 2:** "Owen Smith puts economy at centre of his pitch for Labour leadership".  
15.18 - 24 Aug 2016 | UK  
Snappa  
Owen Smith has something to say about all the Jeremy Corbyn supporters who booed Sadiq Khan  
16.15 - 22 Aug 2016 | News

The interface also includes a top navigation bar with "Home", "News", "Sport", "Real Life", "Motoring", and "Snappa". A "Log Out" link is visible in the top right corner. At the bottom right, there is a copyright notice: "Copyright © 2016 Press Association".

# MoMa Painting Collection Through Time



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Universidad de Buenos Aires

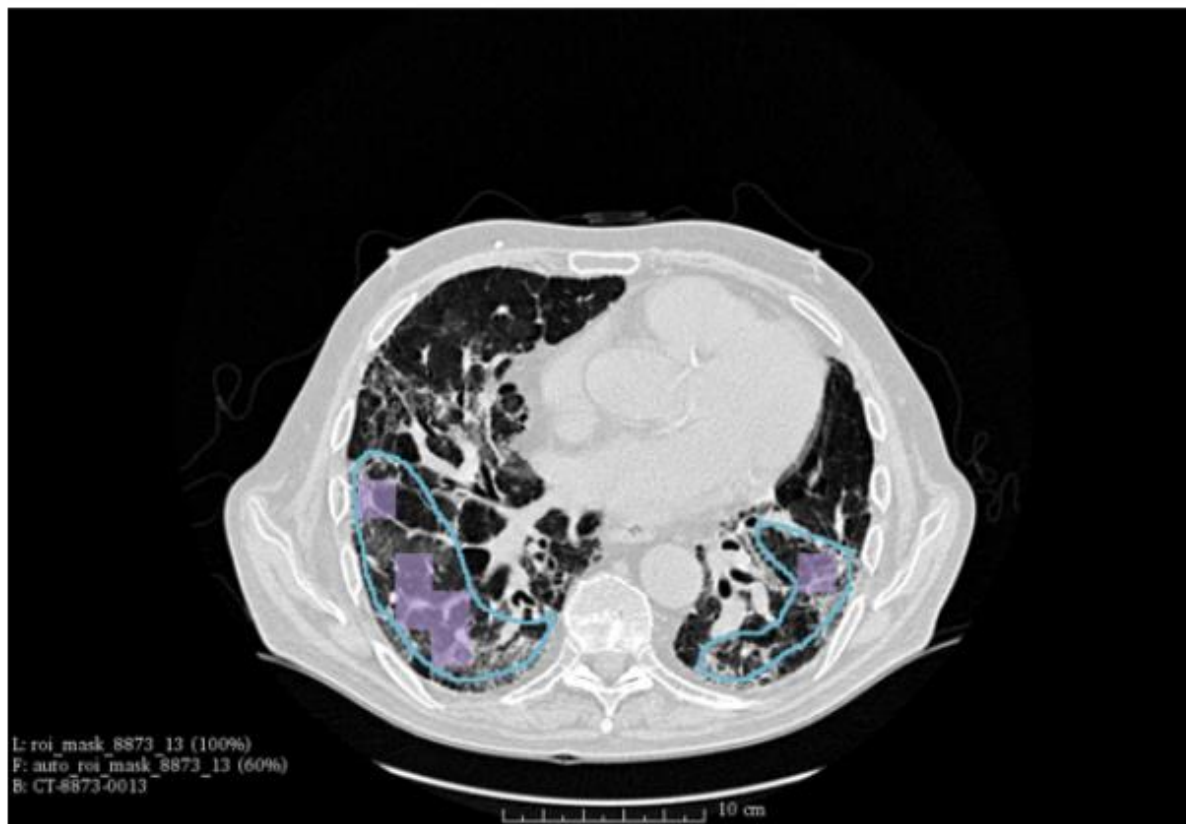


0:46 / 0:56



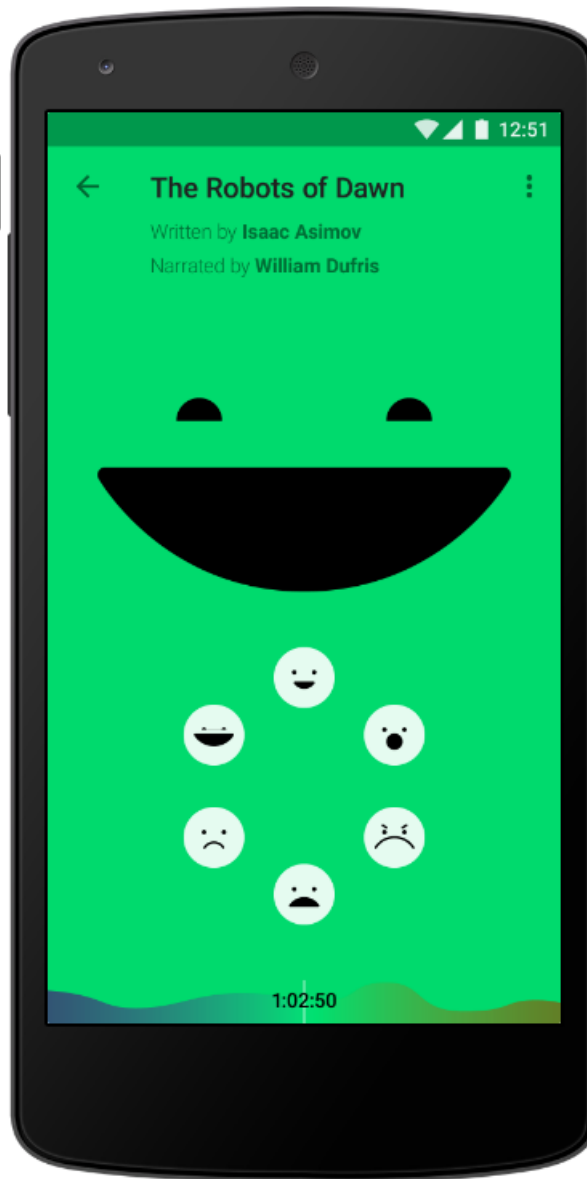


## Characterization of Pulmonary Fibrosis on HRCT Images Using Deep Learning.



The team decomposed each image with radiologist outlines into 28x28 pixel subframes and ran them through a Convolutional Neural Network (CNN) with two convolutional and two subsampling layers in order to analyze tissue patterns specific to fibrosis. Predicted labels appear in this as squares overlapping the original annotation and are added to the final patient study for doctors and radiologists to focus on critical regions of interest and thus improve diagnosis.

# Emotible. Audible Hackathon



embrace

HOME

ABSTRACT

OVERVIEW

DETAILED DESIGN

DEMONSTRATION

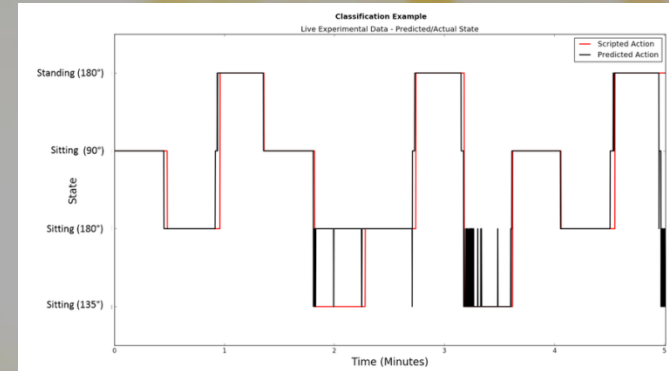
RESULTS

FUTURE WORK

CONCLUSION

MORE...

embrace  
Smart Orthopedic Braces



# Bloomberg for Social Good Exchange



# OTROS PROYECTOS

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# Fin

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xavierign@gmail.com

**GRACIAS!!!!!!**

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