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A Short Tour OCR, ICR, DIA

Abdel Belaïd

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A Short Tour of OCR, ICR, DIA

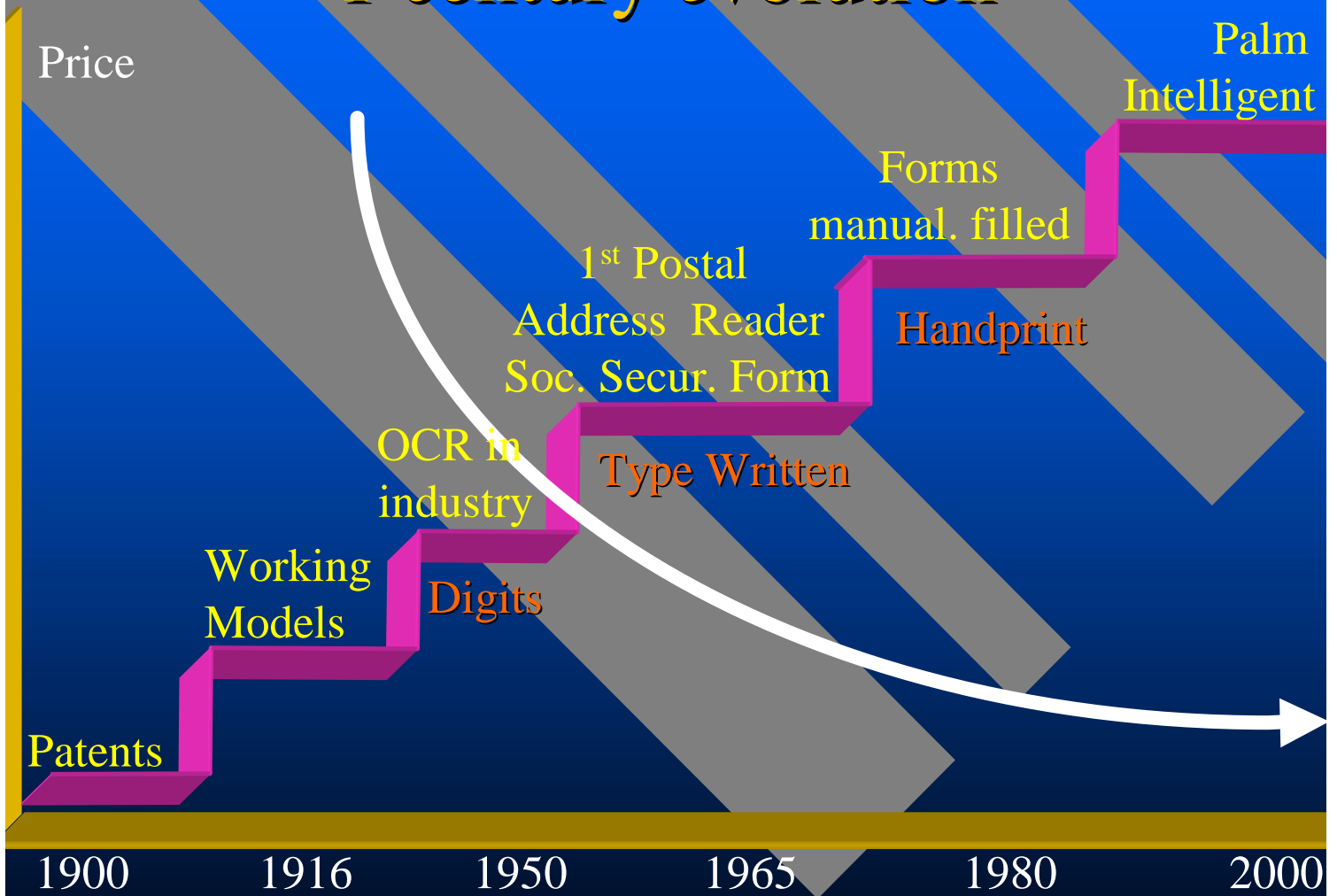
A. Belaïd



READ Group
Nancy, France



Historical 1 century evolution



Handwritten-Printed

Handwriting

Approaches

- Training
- Recognition
- Contextual analysis

Printed

Applications

- Interface
- Postal au
- Bank che
- Forms

- Reading au
- Retro conv
- Translation

Connected
started (Free)

Separated
nt Style
yout

Handwriting:

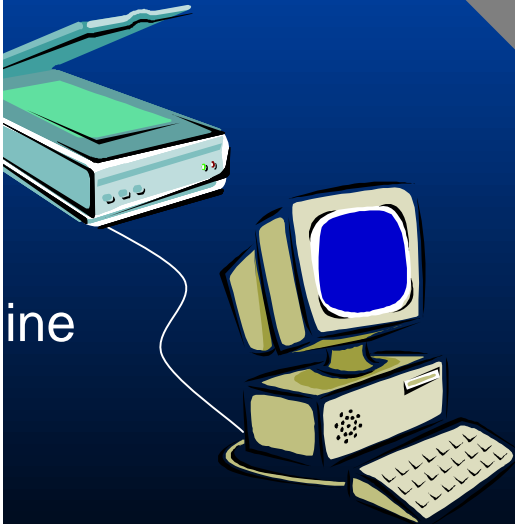
Complexity : determinant factors

Acquisition

Spatial writing style [Tappert 1980]



On-line (Trackpad)



Off-line

BOXED DISCRETE CHAR

Spaced Discrete Characters

Run-on discretely written characters

pure cursive script writing

Mixed Cursive and Discrete

Writer Number

Mono, Multi, Omni-writer

Vocabulary Size

Very limited (<100 words), Extended (<10 000 words), Open

Dr. Belaïd

IWTDIL-2001, Calcutta 26/03/01

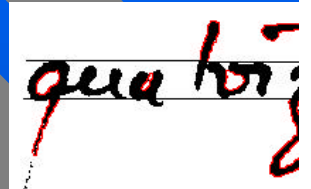
Handwriting:

Methodology : different choices

discriminant



Global
(holistic)

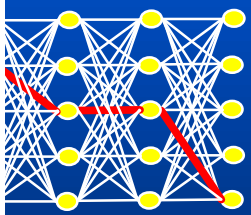


Training

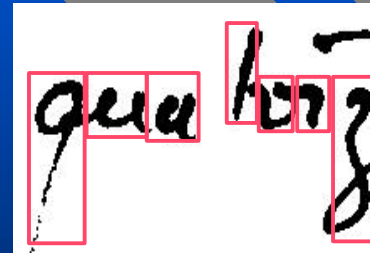
Recognition

Segmentation

discriminant



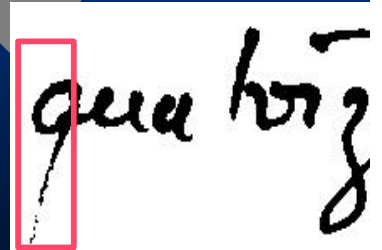
Analytical



External



Internal



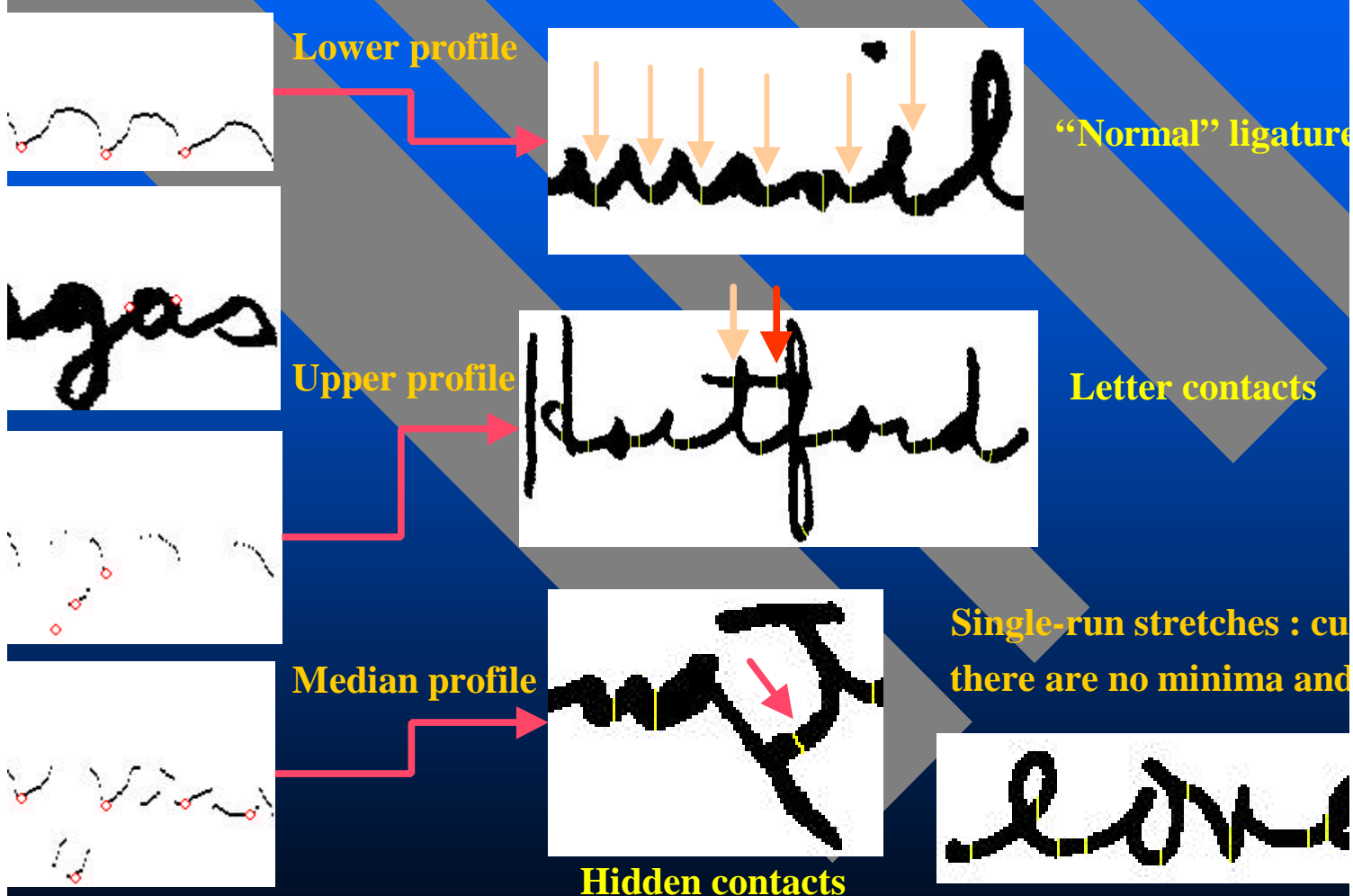
Sliding Window

Shape Analysis

As quick as thought is an old mode of expression used to convey an idea of the greatest rapidity; but no one until lately ever dreamed that a thought could be sent hundreds of miles in a few seconds, and that a person standing in London might hold a conversation with another in Edinburgh, put questions and receive answers, just as if they were seated together in one room, instead of being three hundred miles apart. The Electric Telegraph is another of the wonderful discoveries of modern times used to convey an idea of the greatest rapidity. But no one, until lately, ever dreamed that a thought could be sent hundreds of miles in a few seconds, and that a person standing in London might hold a conversation with another in Edinburgh, put questions and receive answers, just as if they were seated together in one room, instead of being three hundred miles apart. The Electric Telegraph is another of the wonderful discoveries of modern times.

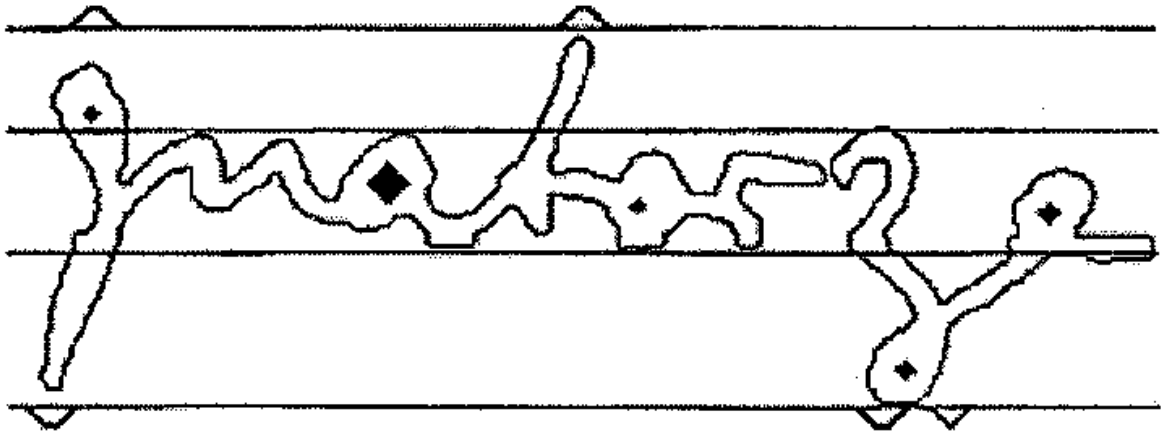
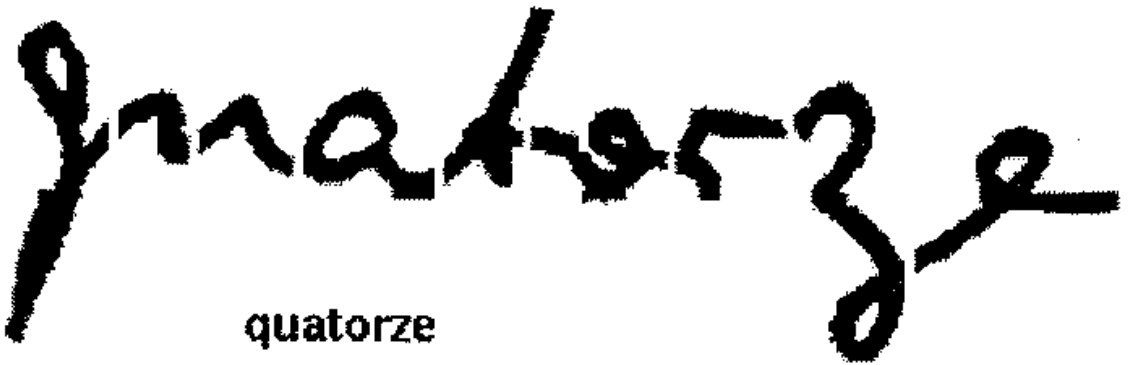
Segmentation

Profile Analysis [C.Scagliola, 2000]



Recognition

quatorze



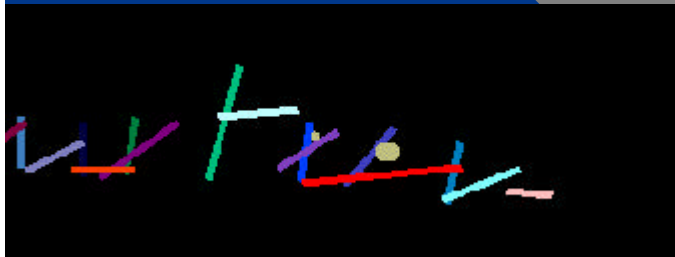
Global description : F — — OH — o — Zo
by a string of symbols

Recognition

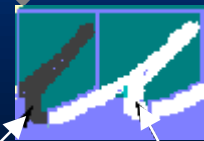
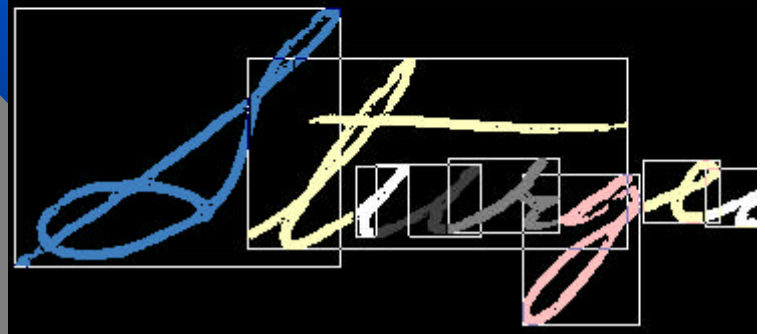
Hierarchical [Lecolinet 1996]

Global

Analytical



representation of the image



1st grapheme

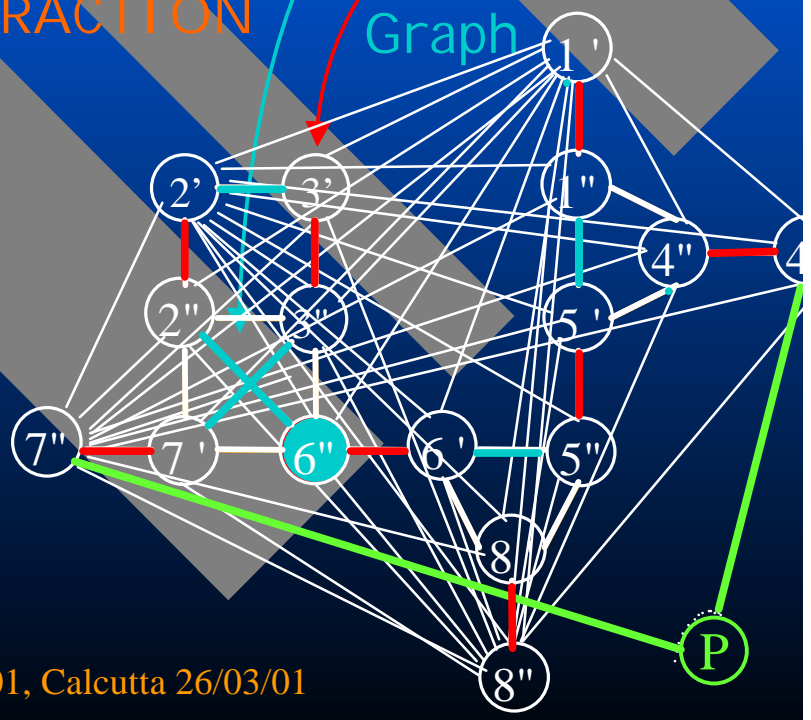
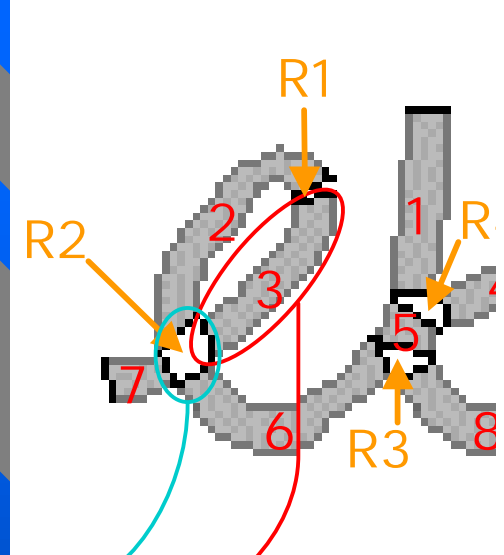
2nd grapheme

From off-line to on-line

[Viard-Gaudin, 2000]

- NODE DEFINITION
- ORIGINAL GRAPH
- COMPLETED GRAPH
- GRAPH VALUATION
- HAMILTONIAN PATH EXTRACTION

Traveling salesman problem :
Hamiltonian cycle search



— Intra link
— Inter link

Active Reading

Xerox Xlibris project

- FX Laboratory Palo Alto

High Resolution Tablet

- Display of the scanned image
- Writing on the screen with digital ink

Reading Interface

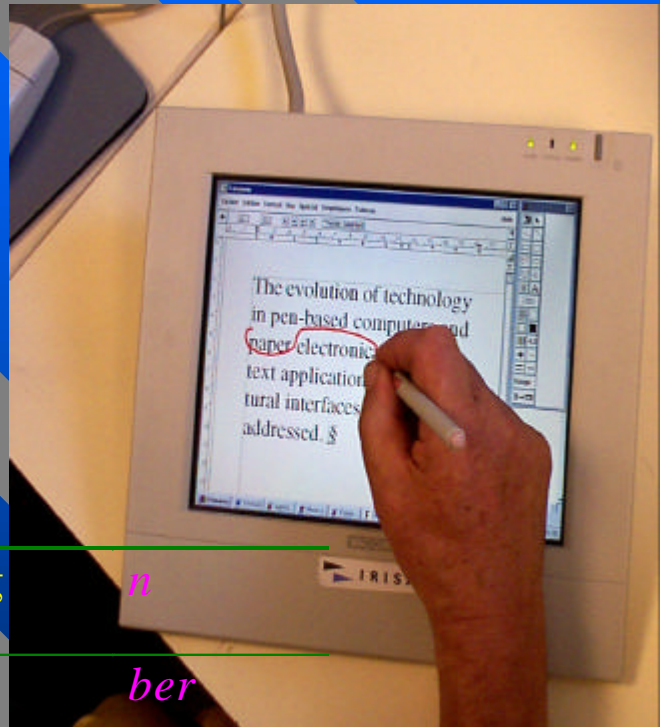
- Reading + action on the text :
underlining, highlighting,
commentaries in the margin
or in a notebook






Annotation and correction

AmayaPen (IRISA) Graphical Interface

- Annotation
- Determination of the text zone



	Gute berg	Gutenberg	n
e /	Gutenan ng	Gutenberg	ber
/	Gutenten berg	Gutenberg	
st	<u>Gutenberg</u>	Gutenberg	<i>Italique</i>
	<u>clavier, souris, etc.</u>	souris, clavier, etc.	
e 	Gutn berg	Gutenberg	

Printed: Determinant factors

on Mode

Off-line / Scanner, Camera

Disposition

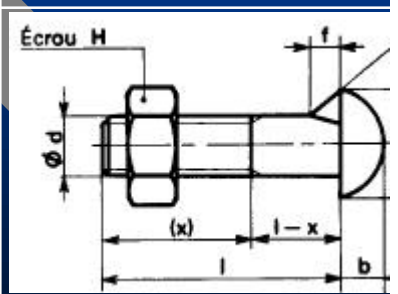
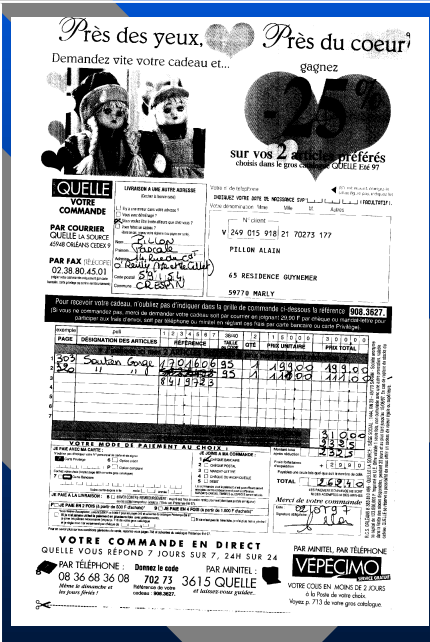
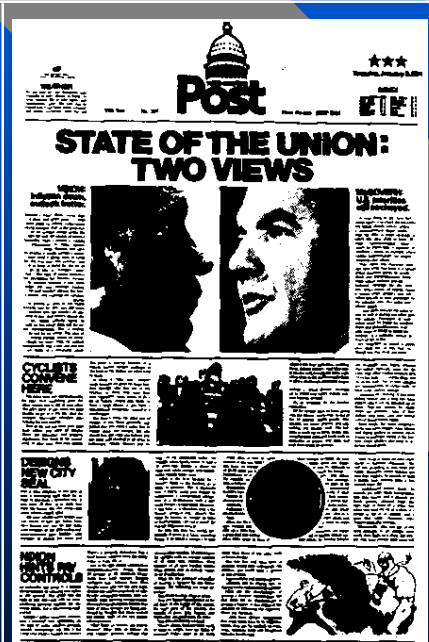
Variable according to the class

Manhattan

Mosaic

Zonal

Non linear



e Number

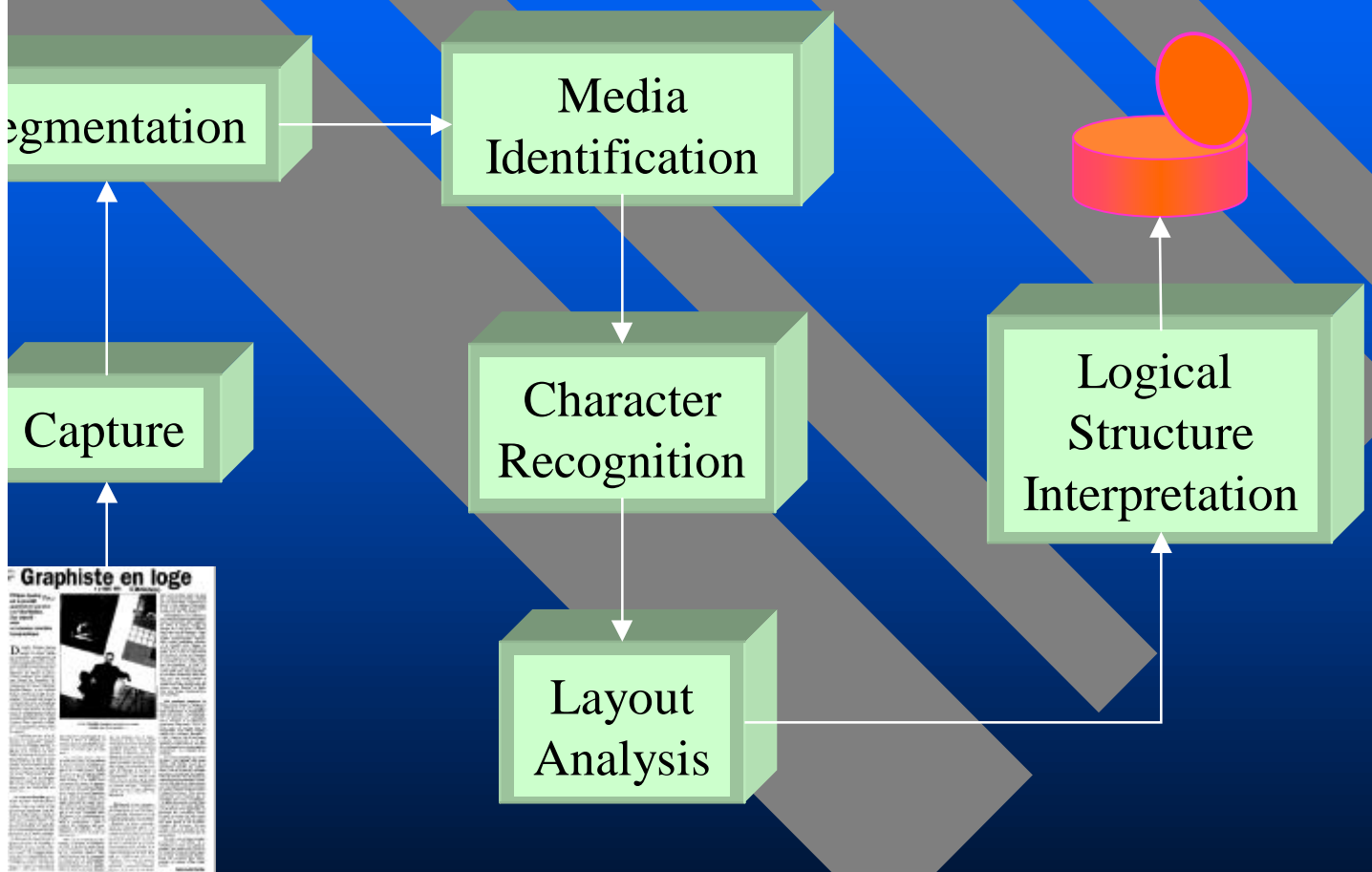
Mono, Multi or Omni-font

. Belaid

IWTDIL-2001, Calcutta 26/03/01

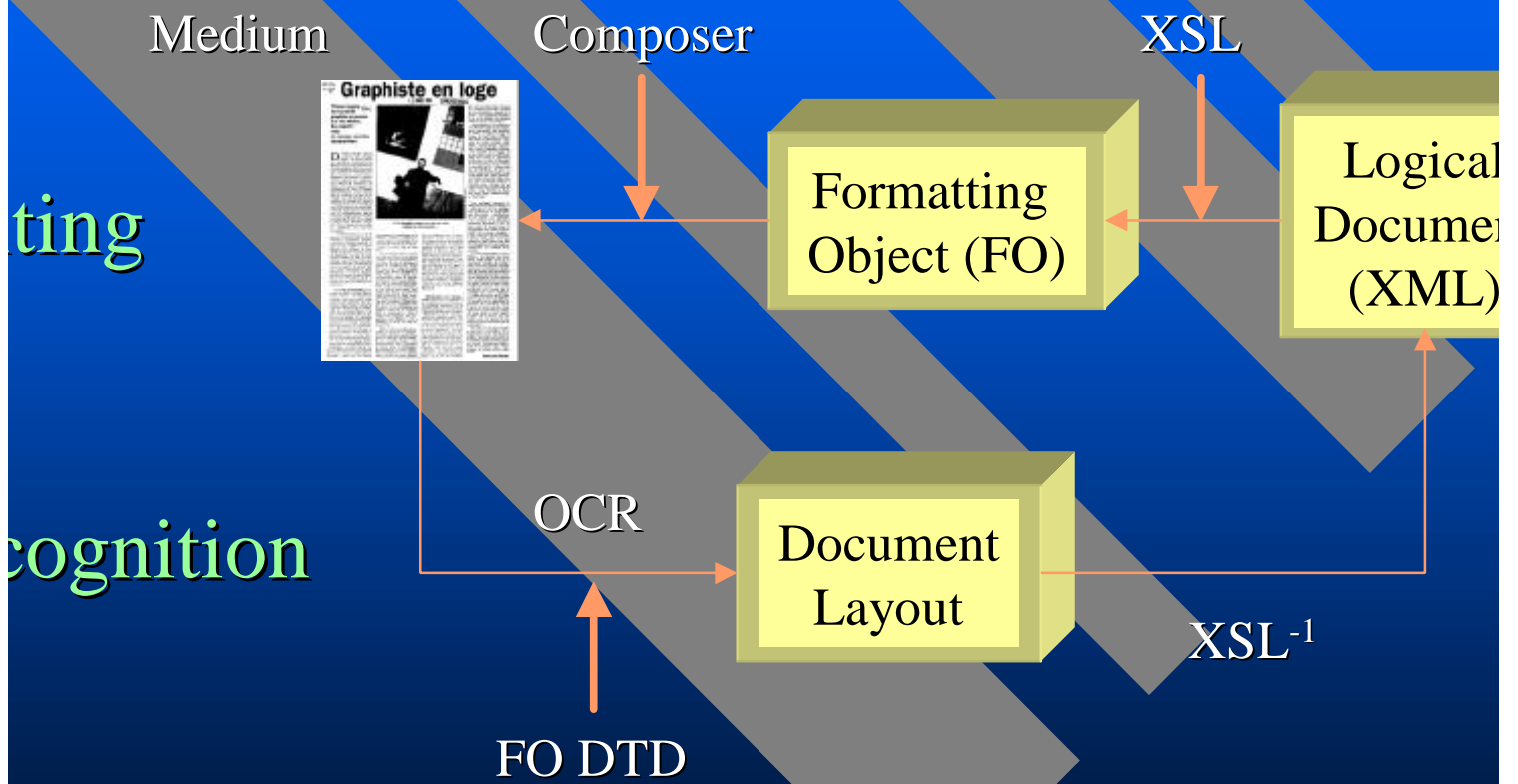
Recognition

The modules



Recognition

But recognition can be seen as the inverse editing process



Giving the idea to use some editing DTD for the recognition production process

Retro-conversion Difficulties

Constraints

- Important Combinatorial
- Media Mixing
- Handwriting

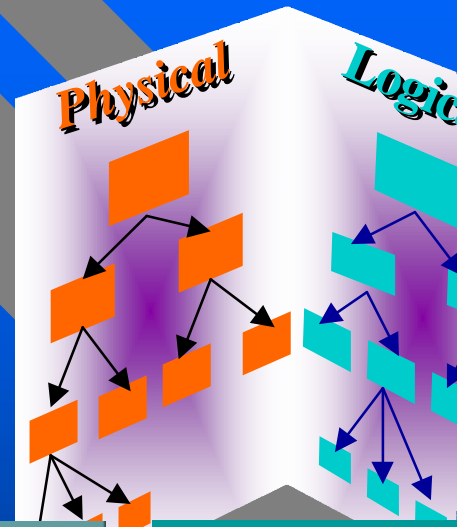
Modeling

- Duality physical-logical
- Imprecision, incertitude

Structors
Qualifiers
Functional Correspondences
Attributes

A. Belaïd

IWTDII



Metrology in Quality Control of Nuts

A. Belaïd
OEDN - UOHA G. BORDJ, Algérie
CAMPUS ESTERITEUR S.T. 200
34000 Inchaï, com. - St. Isidore, ALGERIE

This paper deals with a quality control system developed for the verification of automated manufacturing processes. The final goal of the project consists in automating the quality control of industrial products. The difficulty lies in the constraints imposed, on the production, such as processing time. All measurements are obtained by the calculation of differences between opposite sides of the nut.

1 Introduction

Automated industrial image processing in quality control of a great diversity of types and dimensions manufactured by the French group COMUSSEK. The objective is a feasibility study of a control by vision techniques and an industrial method to measure the real performance of the system.

Nuts	Measurements
Height (h)	h ₁ h ₂ h ₃ h ₄ h ₅ h ₆ h ₇ h ₈ h ₉ h ₁₀
Area (A)	A ₁ A ₂ A ₃ A ₄ A ₅ A ₆ A ₇ A ₈ A ₉ A ₁₀
Mass (M)	M ₁ M ₂ M ₃ M ₄ M ₅ M ₆ M ₇ M ₈ M ₉ M ₁₀

2 Nature of the measurements

In the metrology (see fig. 1), the measurements correspond to height and outside diameter (h, H), height (h, H), to the radius of protrusion (r), and the control of internal (r). The protrusion is considered as related to the nut to take place of a disc. It is the place of the protrusion that

is adapted to the nut. In the following, we shall calculate the number of threads and the average gap between them.

Figure 1 Example of nuts

3 Parameter measurements

The parameter measurements are based on edge extraction and on measurements of distances between local lines. A method is presented to the system in any extraction and any position in the field of view.

For the nuts studied now (see fig. 2), the measurements correspond to inside and outside diameters (d, D), height (h, H), to the radius of protrusion (r), and the control of internal (r). The protrusion is considered as related to the nut to take place of a disc. It is the place of the protrusion that

is adapted to calculate image processing in quality control of a great diversity of types and dimensions manufactured by the French group COMUSSEK. The objective is a feasibility study of the control by vision techniques and an industrial method to measure the real performance of the system.

Title

Author

Affiliation

Abstract

1st Title

Paragraph

Table

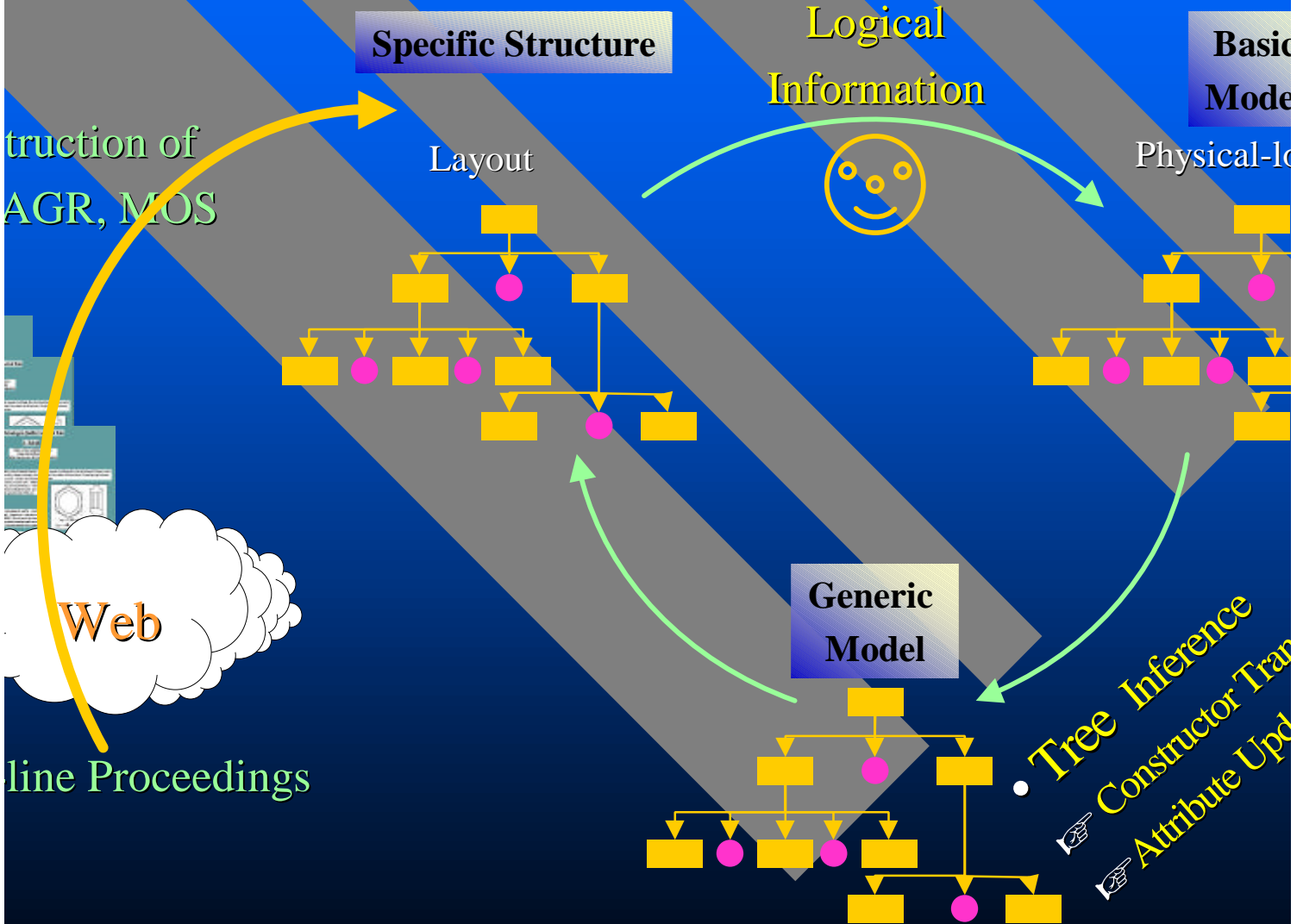
Paragraph

2nd Title

Paragraph

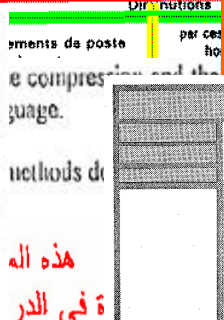
Automatic Generation

[Akindele-Belaïd 1994]



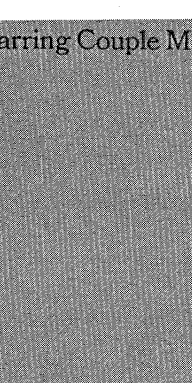
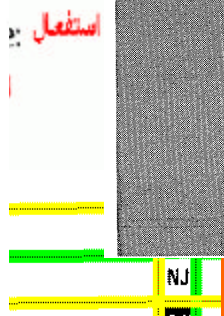
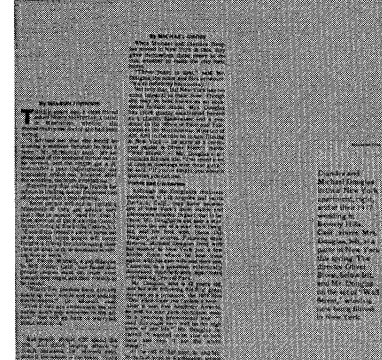
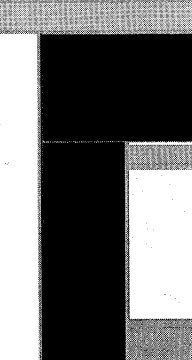
Segmentation

Hough [Belaid-Belaid 1996] Fuzzy Sets [Kacem-Belaid
 A [Wong 1982] Documents [Akindede-Belaid 92]
 Fractals [Belaid 1997]



3. A BOOTSTRAP APPROACH FOR M SELECTION

We assume that $\alpha = n$ and $\beta = m$. The optimal n



50 000

TOTAL GENERAL (I + II + III + IV)

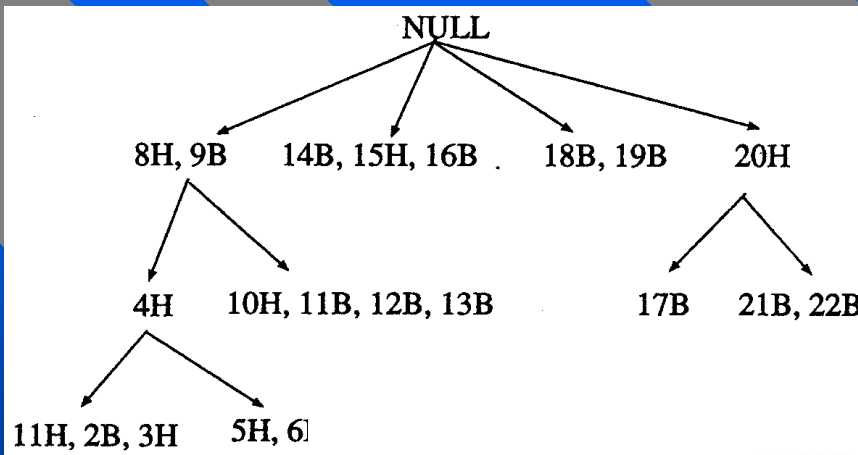
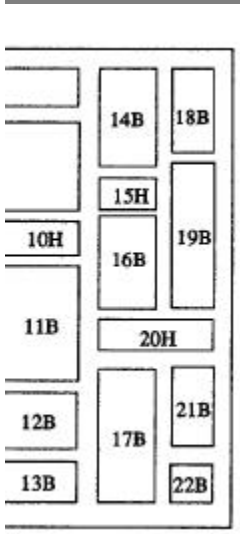
NJ OK

$g_k(t)$
 dis
 T -
 X
 l u
 \sqrt{t}
 obs
 = 1,
 =
 d in
 (t),
 $\sum_{k=1}^n g_k(t) - \sum_{r=0}^m$

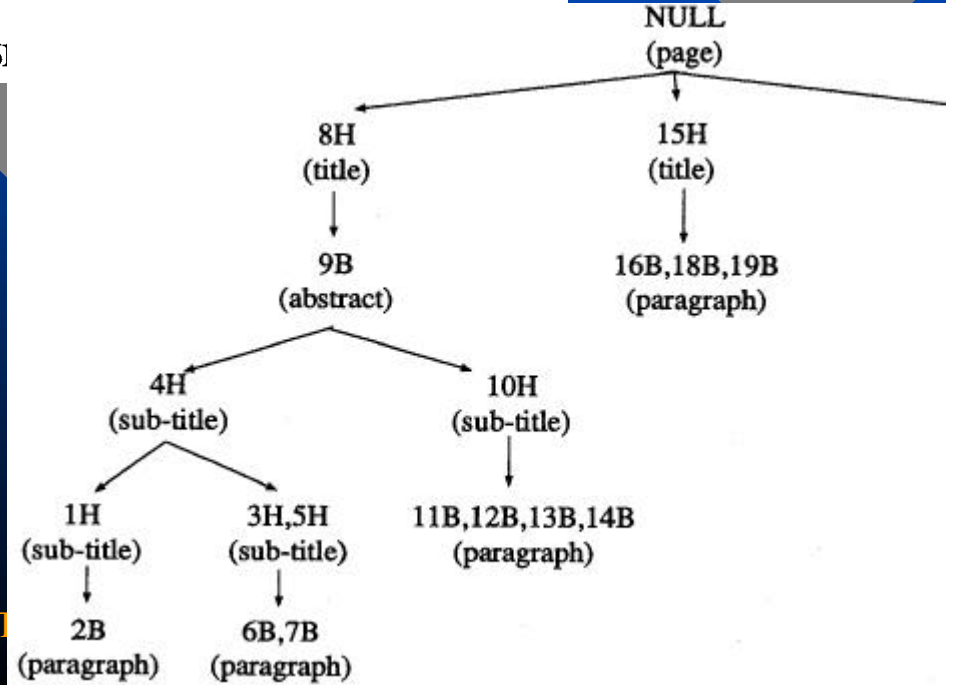
Recognition

Bottom-up Approach [Tsujiimoto 92]

Geometrical Structure



Logical Structure



and block
by Block
by ou Head

Recognition

Top-Down Approach [Coasnon-Lorette 1998]


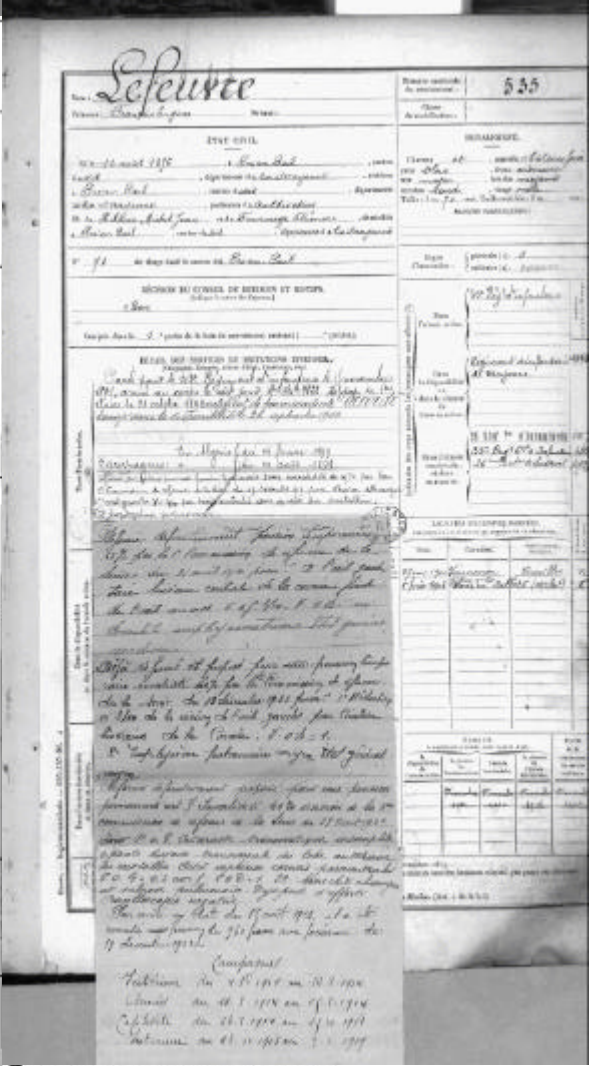
Positional grammatical Formalism

- » Document Description Language
- » Mixing syntactical & graphical description

Associated Analyzer

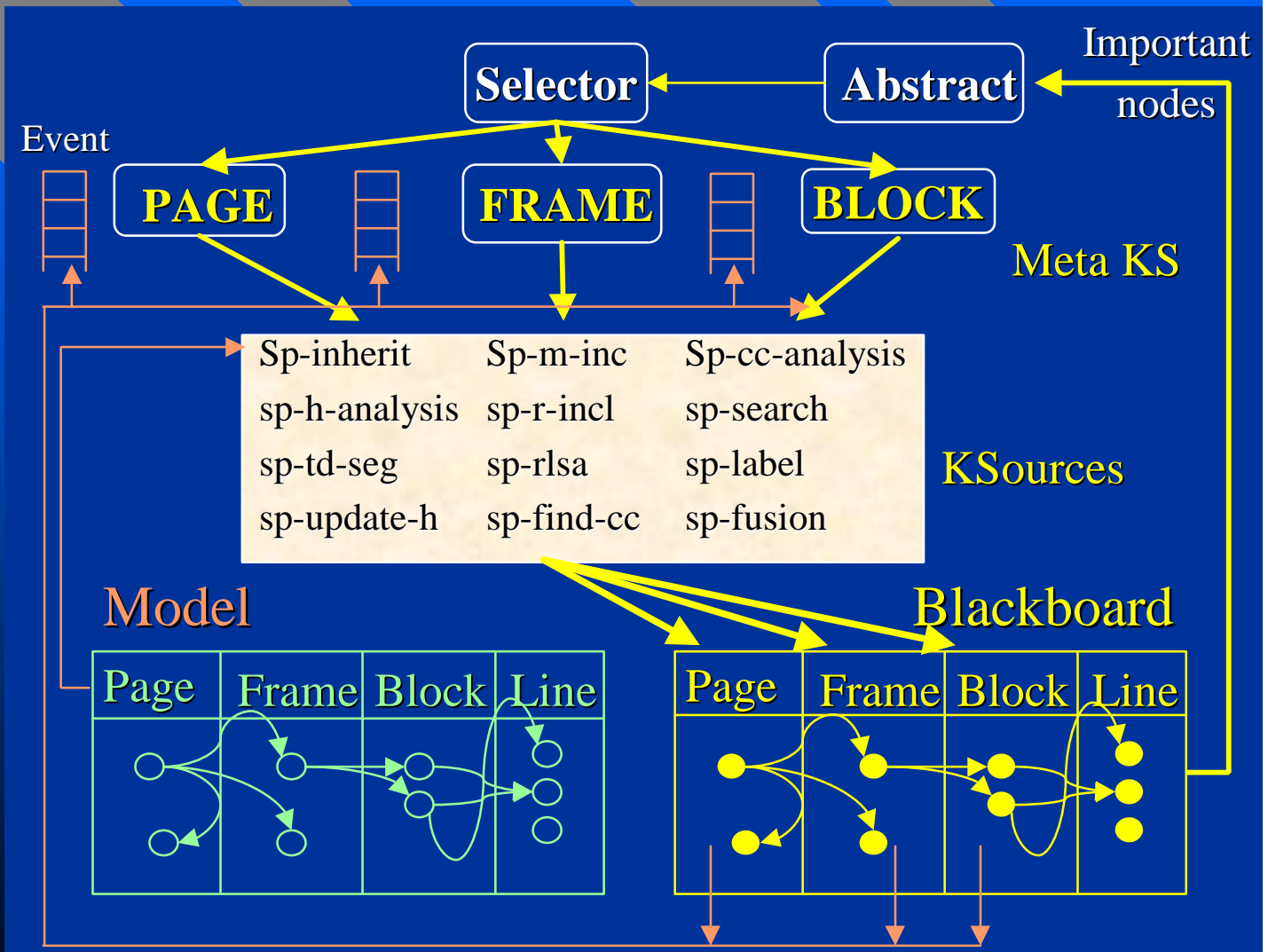
- » Reconsidering structure analyzed during analysis

$$\frac{2}{3} - \frac{\int_0^{\frac{x}{2}} y^2 + 3dy}{\frac{2}{3} + 56} - 1 + 2 \times$$

 <p>INRIA Édition 1994</p>	
<p>RÉFÉRENCES DU DEMANDEUR</p>	<p>INTE CIVIL</p> <p>INTE CIVIL</p>
<p>OBJET DE LA MISSION</p>	<p>OBJET DE LA MISSION</p>
<p>DÉROULEMENT DE LA MISSION</p>	<p>DÉROULEMENT DE LA MISSION</p>
<p>PRISE EN CHARGE DE LA MISSION</p>	<p>PRISE EN CHARGE DE LA MISSION</p>
<p>IMPUTATION</p>	<p>IMPUTATION</p>

Recognition

Multi-Agent Approach [Chenevoy-Belaïd 90]



Anchor Points

[Valverde-Belaïd 1999]

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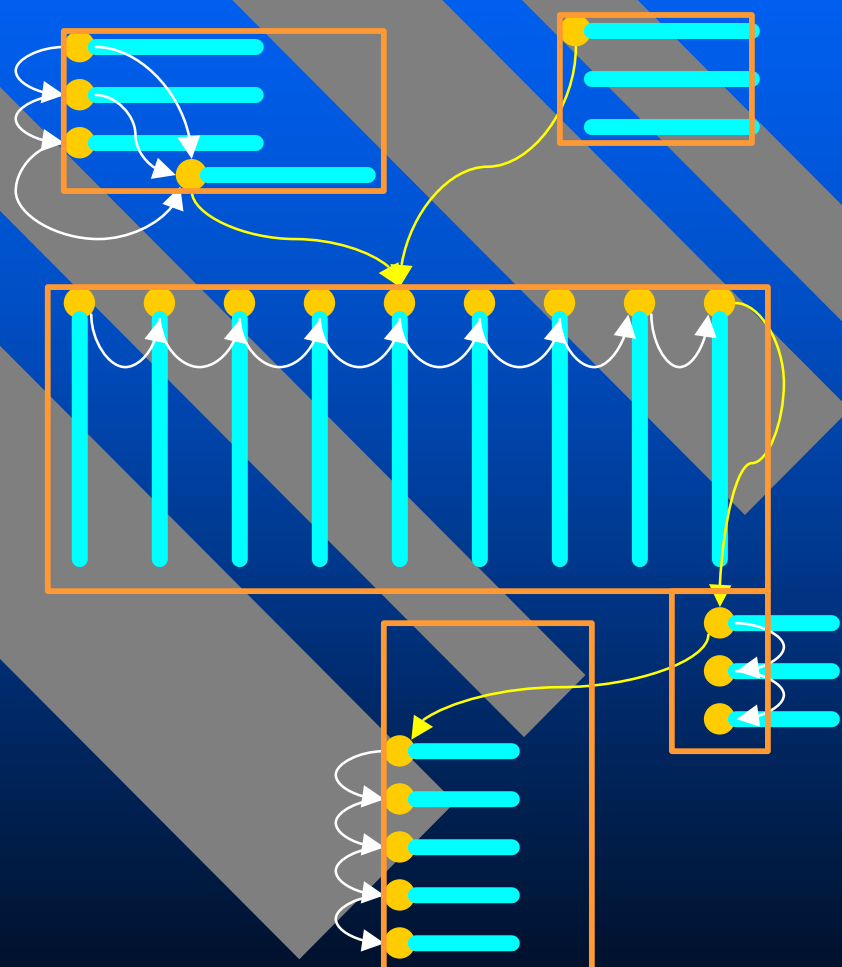
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Conclusion

- **More and more paper !** In spite of the technology progress
- **New needs in the industry** With supplementary requirements
 - High Robustness (—> 1 error / 10 000),
 - Fast Adaptation => changing structure
 - High Volumes => increase velocity, consider the overflow
- **Not only paper**
 - Document structure on the web
- **System to develop** should propose
 - Distributed architecture for DIA
 - » Useful structure (XML...), overflow solutions
 - Automatic production of meta-data
 - » making document readable and exchangeable on the Web