

A Short Tour OCR, ICR, DIA

Abdel Belaïd

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A Short Tour of OCR, ICR, DIA

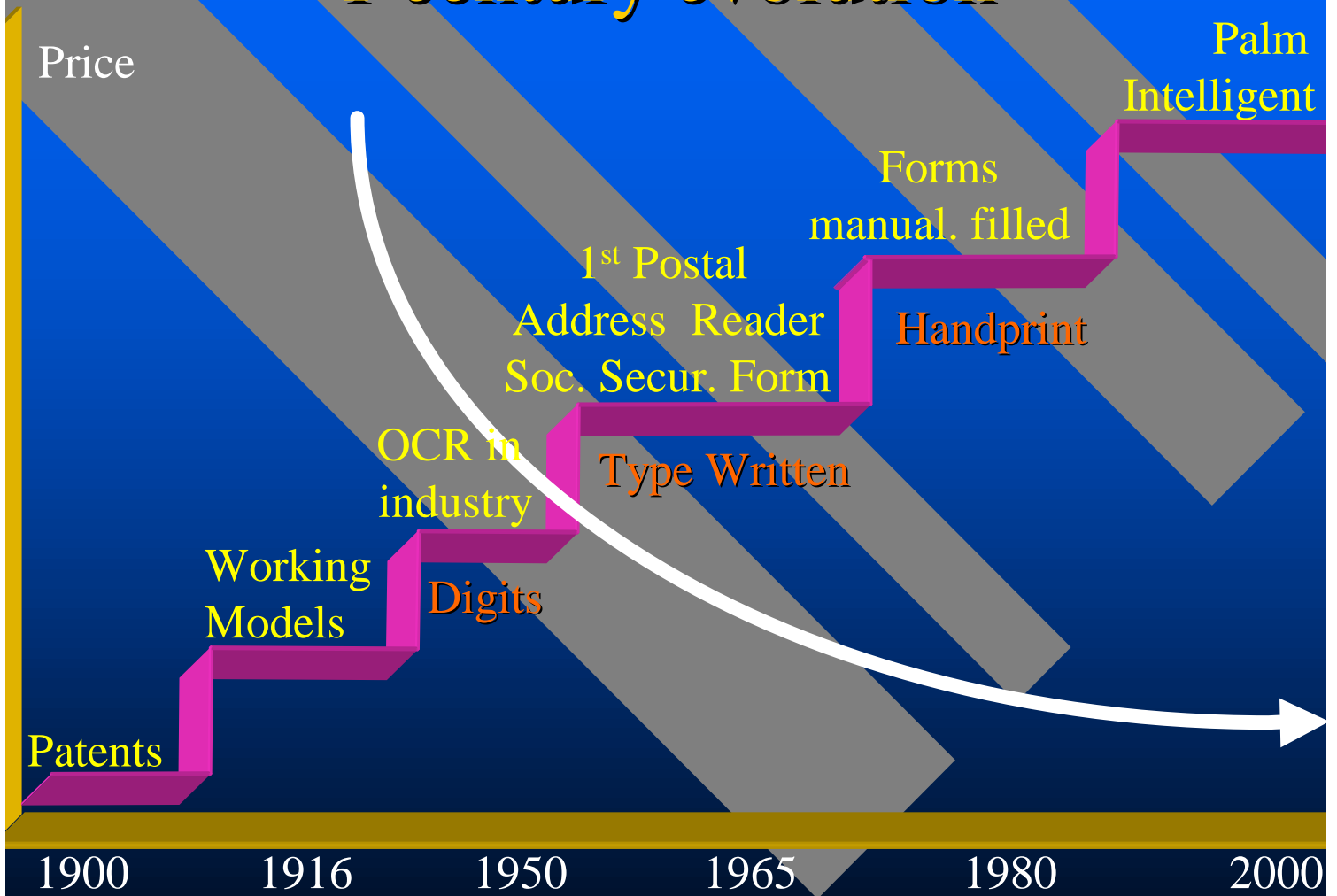
A. Belaïd



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:

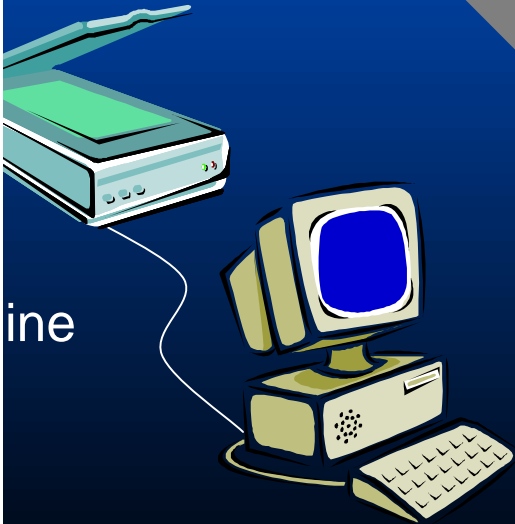
Complexity : determinant factors

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

. Belaïd

IWTDIL-2001, Calcutta 26/03/01

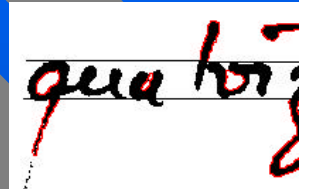
Handwriting:

Methodology : different choices

discriminant



Global
(holistic)

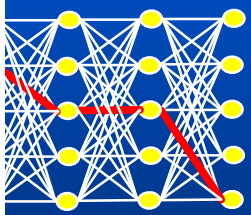


Training

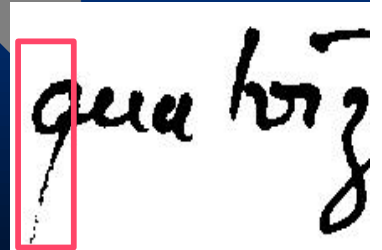
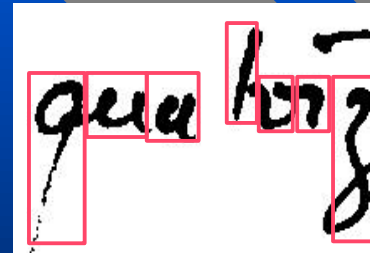
Recognition

Segmentation

discriminant



Analytical



External

Internal

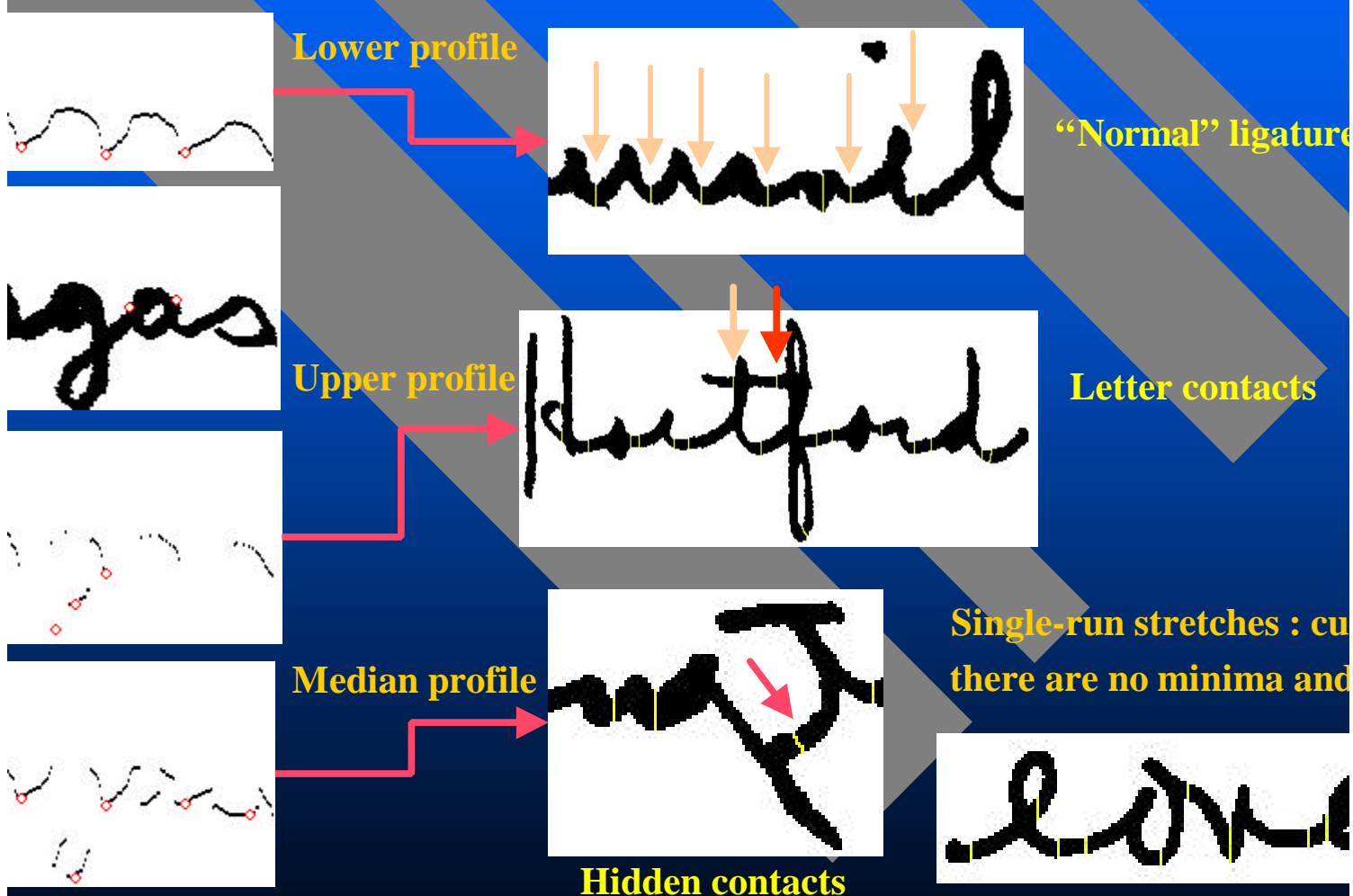
Sliding Window

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.

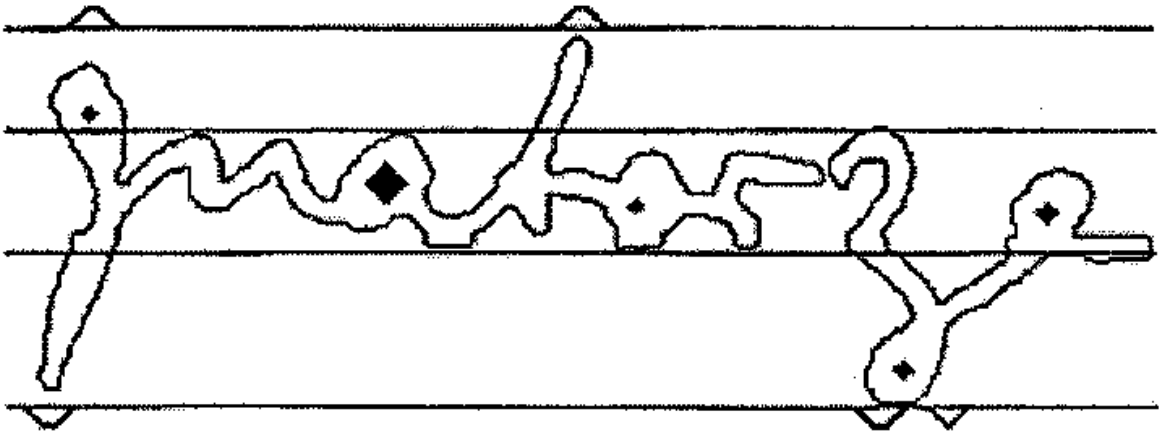
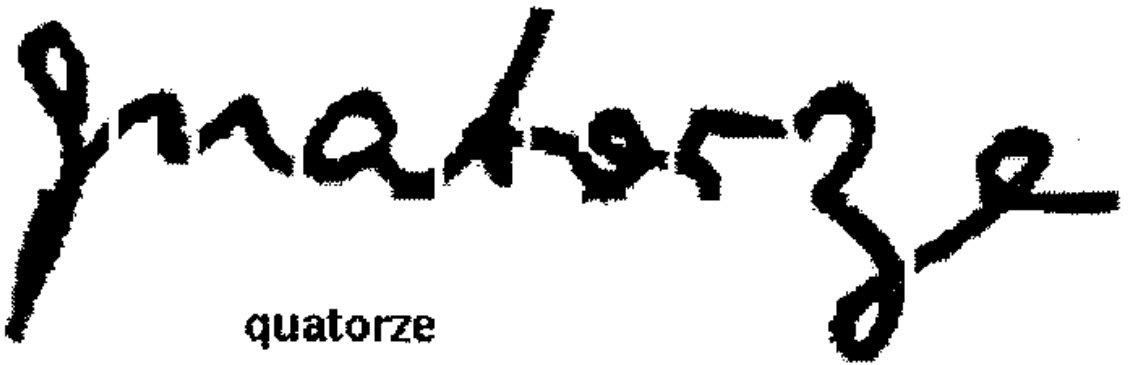
Segmentation

Profile Analysis [C.Scagliola, 2000]



Recognition

quatorze



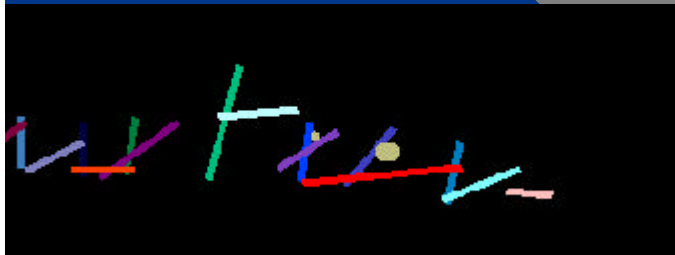
Global description : F — — OH — o — Zo
by a string of symbols

Recognition

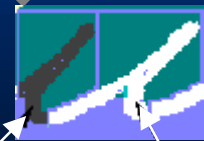
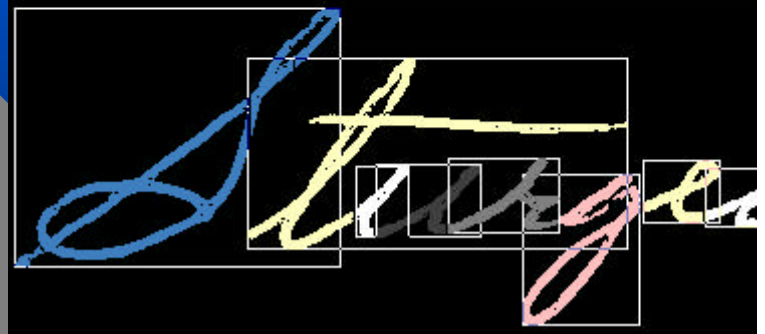
Hierarchical [Lecolinet 1996]

Global

Analytical



representation of the image



1st grapheme

2nd grapheme

From off-line to on-line

[Viard-Gaudin, 2000]

NODE DEFINITION

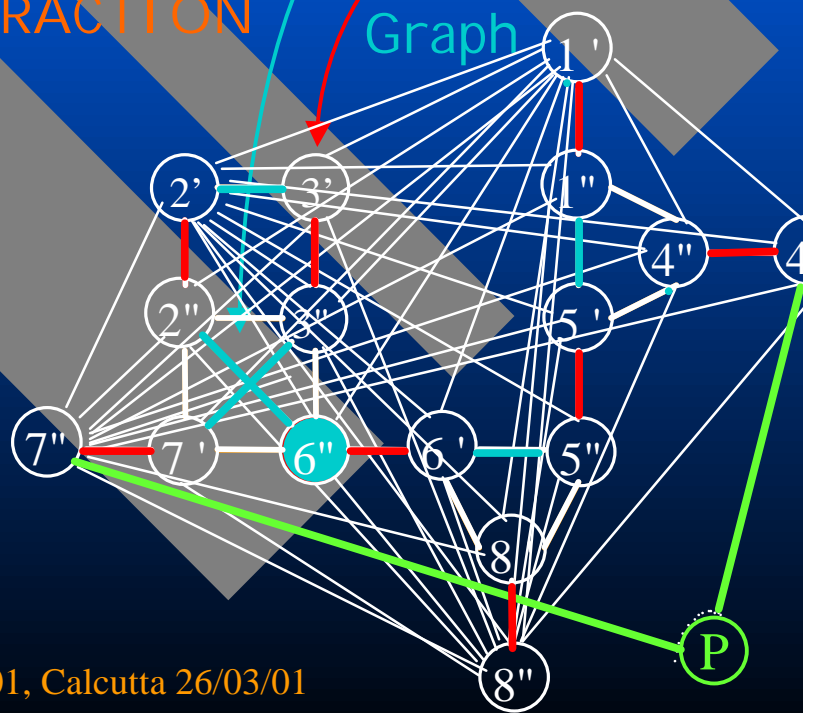
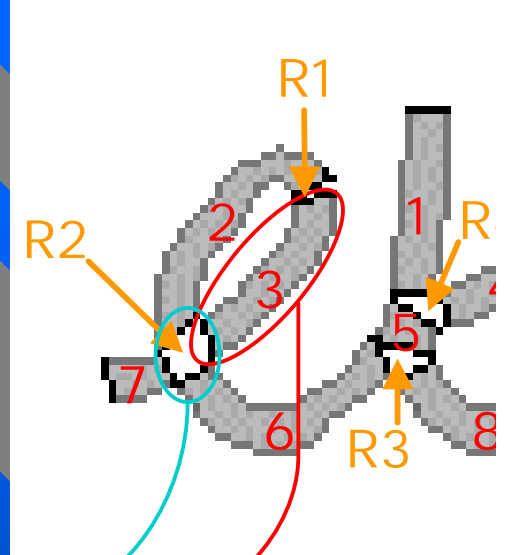
ORIGINAL GRAPH

COMPLETED GRAPH

GRAPH VALUATION

HAMILTONIAN PATH EXTRACTION

Travel 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

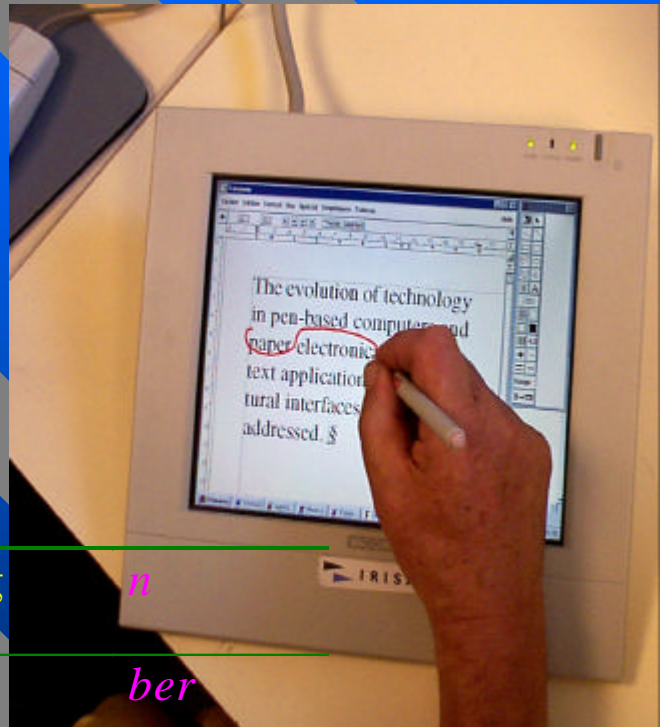
- Reading + action on the text :
underlining, highlighting,
commentaries in the margin
or in a notebook



Annotation and correction

AmayaPen (IRISA) Graphical Interface

- Annotation
- Determination of the text zone



	Gute berg	Gutenberg	n
	Gutenan ng	Gutenberg	ber
	Gutent berg	Gutenberg	
	<u>Gutenberg</u>	Gutenberg	<i>Italique</i>
	<u>clavier, souris, etc.</u>	souris, clavier, etc.	
	Gut berg	Gutenberg	

Printed: Determinant factors

on Mode

Off-line / Scanner, Camera

Disposition

Variable according to the class

Manhattan

Mosaic

Zonal

Non linear

Enjeux
SCIENTIFIQUE

UN SCHEMA
TEUR POUR
ORMATIQUE

Une orientation essentielle :
le développement
du calcul numérique

Post
ETÉ

STATE OF THE UNION:
TWO VIEWS

Près des yeux, Près du cœur
Demandez vite votre cadeau et... gagnez

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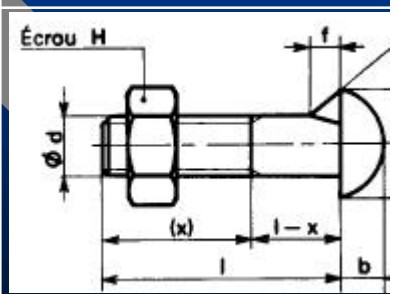
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FRANCE	1000	1	449,00	449,00
FRANCE	850	1	449,00	449,00

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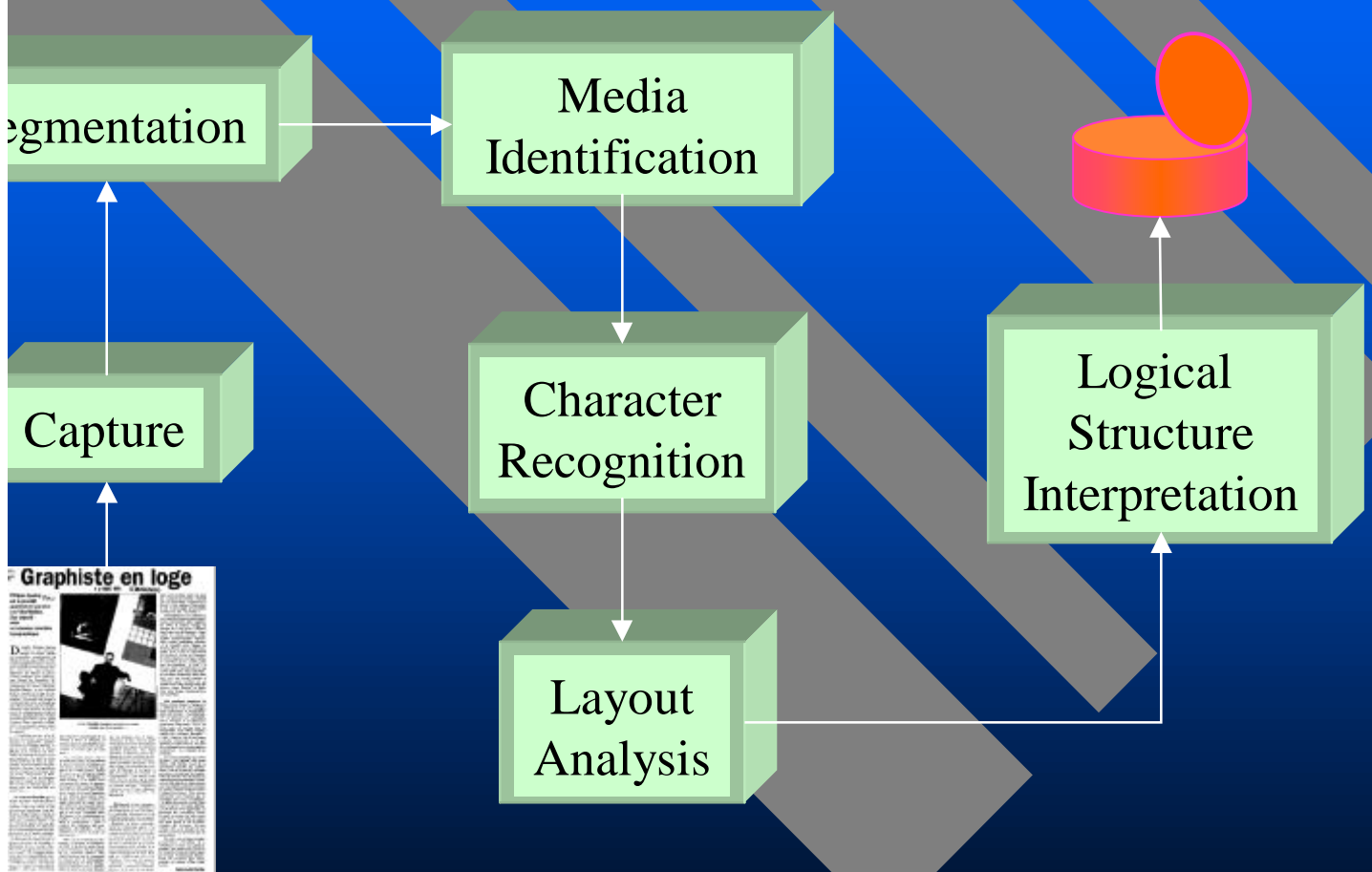
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IWTDIL-2001, Calcutta 26/03/01

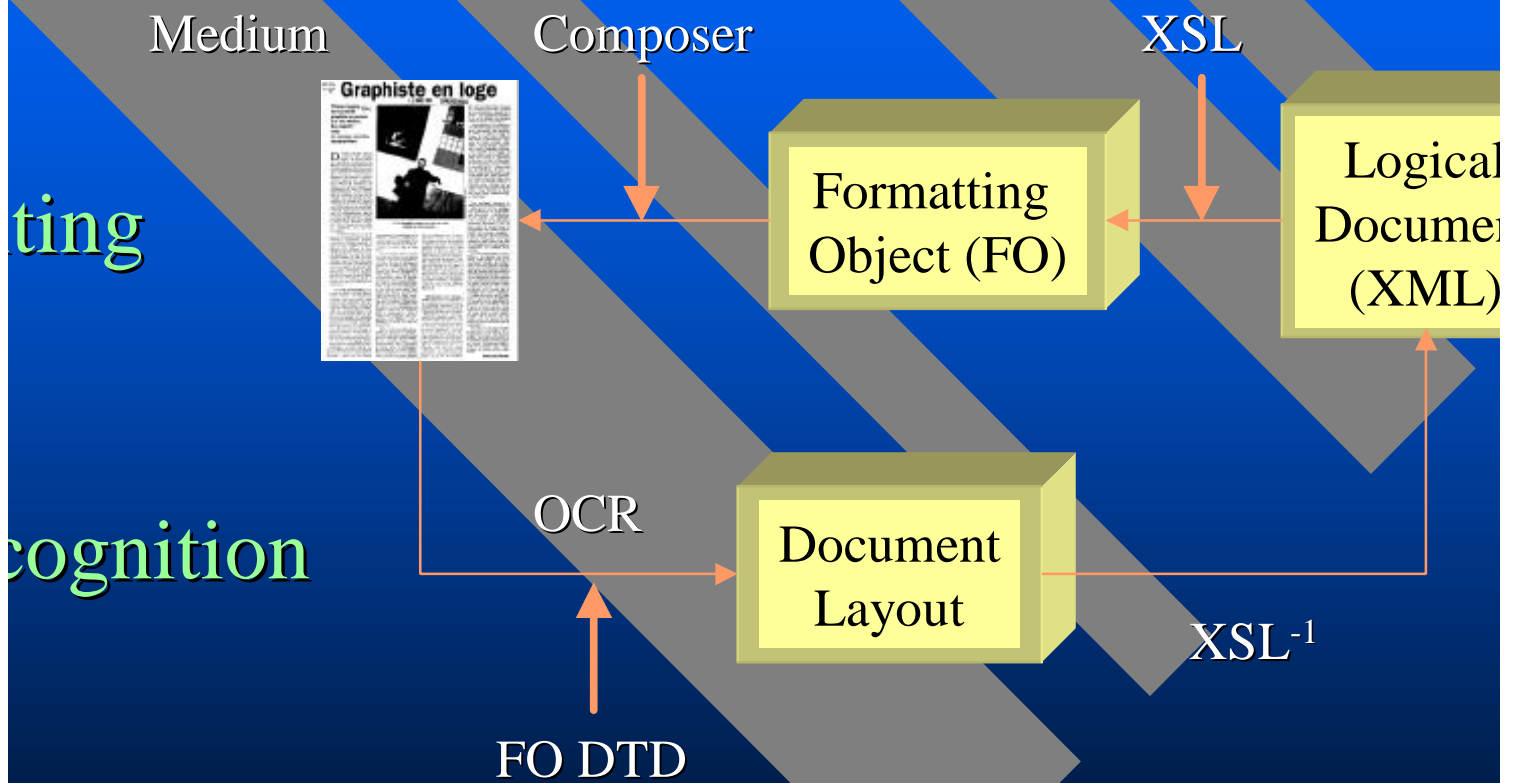
Recognition

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

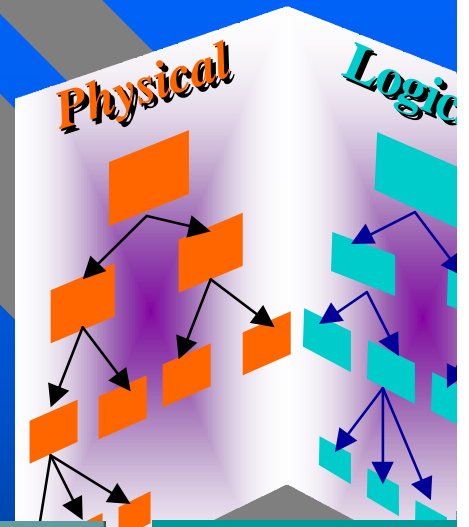
Modeling

- Duality physical-logical
- Imprecision, incertitude

Structors
Qualifiers
Functional Correspondences
Attributes

A. Belaïd

IWTDII



Metrology in Quality Control of Nuts

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CAMPUS UNIVERSITAIRE S.T.S. 100
50000 Inchaï - com. - St. Jean, ELIZABETH

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

Our work deals with image processing in quality control of a nut of different types and dimensions manufactured by the French group GROBESQUE. The objective is an automatic study of the control by image techniques and an industrial method to measure the real performance of the system.

Nuts	Measurements
Height (mm)	20 25 30 35 40 45 50 55 60 65
Width (mm)	20 25 30 35 40 45 50 55 60 65
Area (mm ²)	20 25 30 35 40 45 50 55 60 65

2 Nature of the measurements

In the metrology (see fig. 1), the measurements correspond to height and width (diameters H_1 , H_2 , h_1 , h_2), to the perimeter (perimeter P), and the control criterion is P .

The preference is an evaluation added to the nut to take place on a line. It is the sign of the production start.

It is simpler to calculate the thickness H_1 than to 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 two lines. A method is presented to the system in any orientation and any position in the field of view.

For the nuts studied now (see fig. 2), the measurements correspond to width and outside diameter (H_1 , H_2 , h_1 , h_2), to the perimeter (perimeter P), and the control criterion is P . The production line consists of a control to the nut to take place on a line. It is the sign of the production start.

Our work deals with image processing in quality control of nut of different types and dimensions manufactured by the French group GROBESQUE. The objective is an automatic study of the control by image techniques and an industrial method to measure the real performance of the system.

Title

Author

Affiliation

Abstract

1st Title

Paragraph

Table

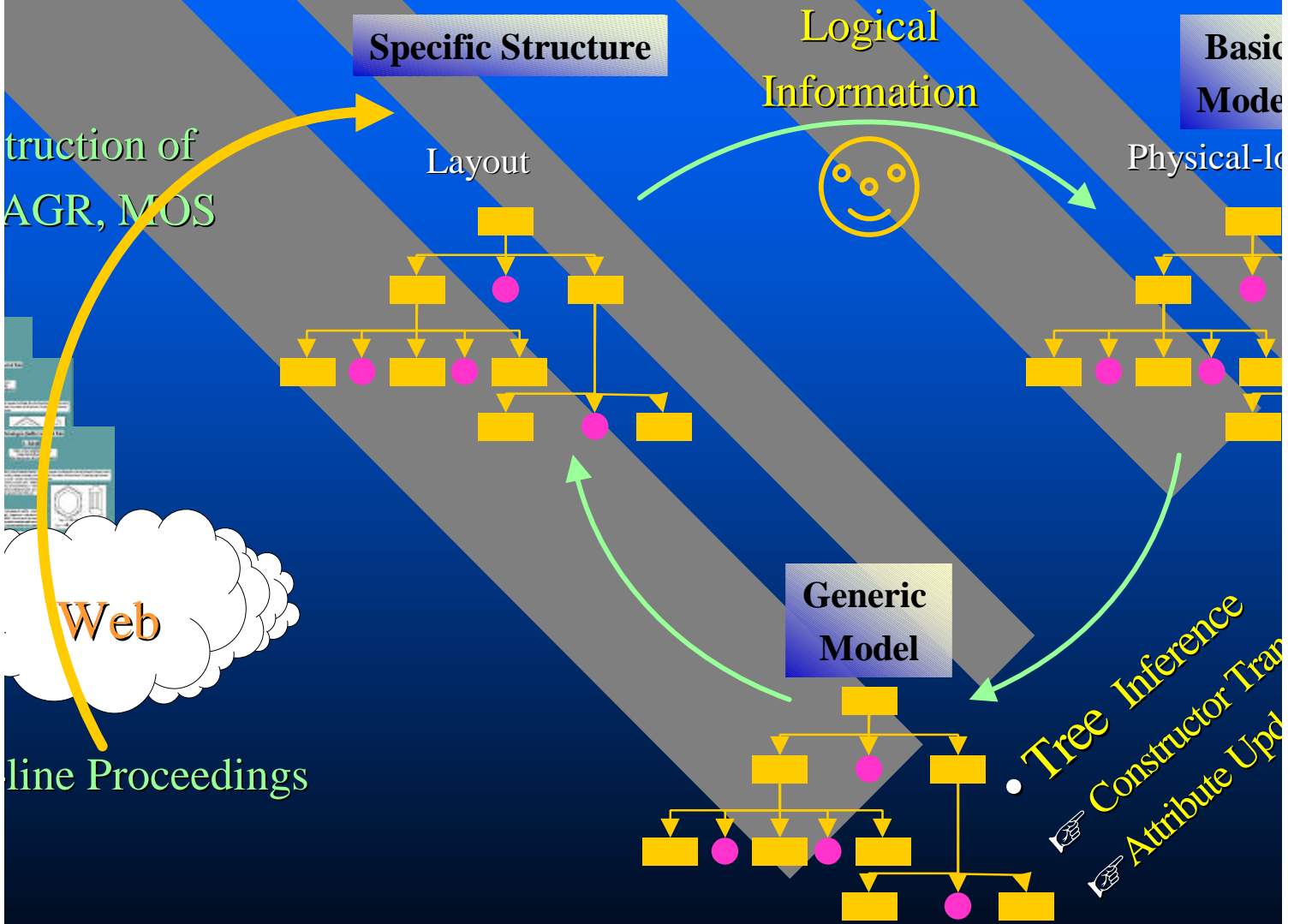
Paragraph

2nd Title

Paragraph

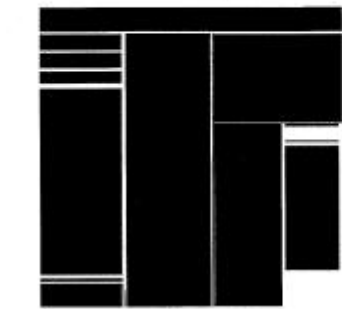
Automatic Generation

[Akindele-Belaïd 1994]



Segmentation

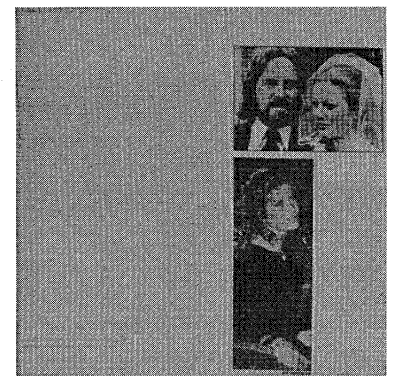
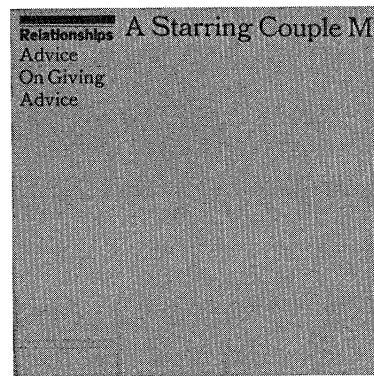
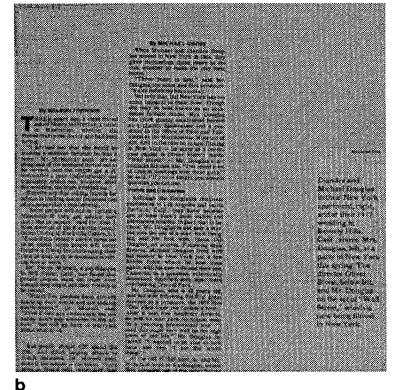
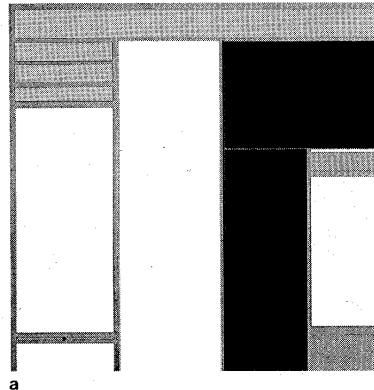
Hough [Belaid-Belaid 1996] Fuzzy Sets [Kacem-Belaid
 A [Wong 1984] Documents [Akindede-Belaid 92]
 Fractals [Belaid 1997]



Directions
 par cent
 Ho
 e compression and the
 guage.
 methods de
 هذه
 في الدر
 موضوع
 فقدان
 المكتبة
 forme
 استعمال

3. A BOOTSTRAP APPROACH FOR M SELECTION

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



TOTAL GENERAL (I + II + III + IV)

50 000

NJ

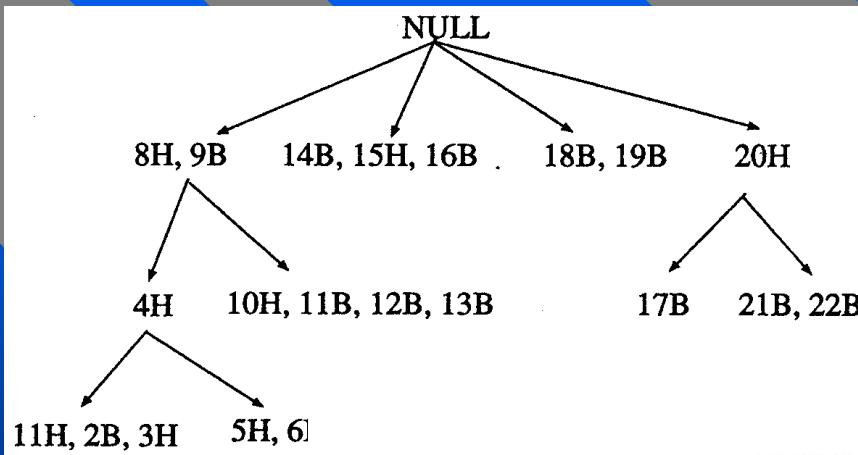
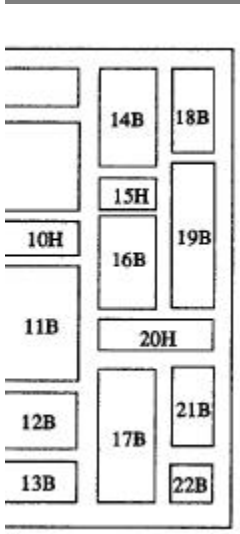
OK

$$\sum_{k=1}^n \sum_{r=0}^m g_k(t) = \sum_{k=1}^n \sum_{r=0}^m g_k(t)$$

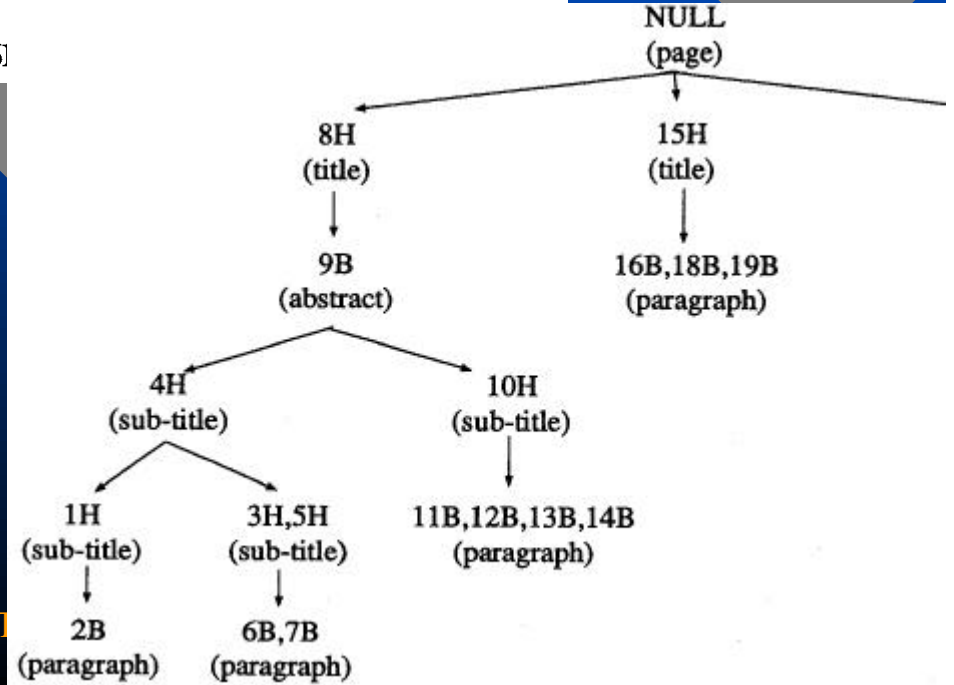
Recognition

Bottom-up Approach [Tsujiimoto 92]

Geometrical Structure



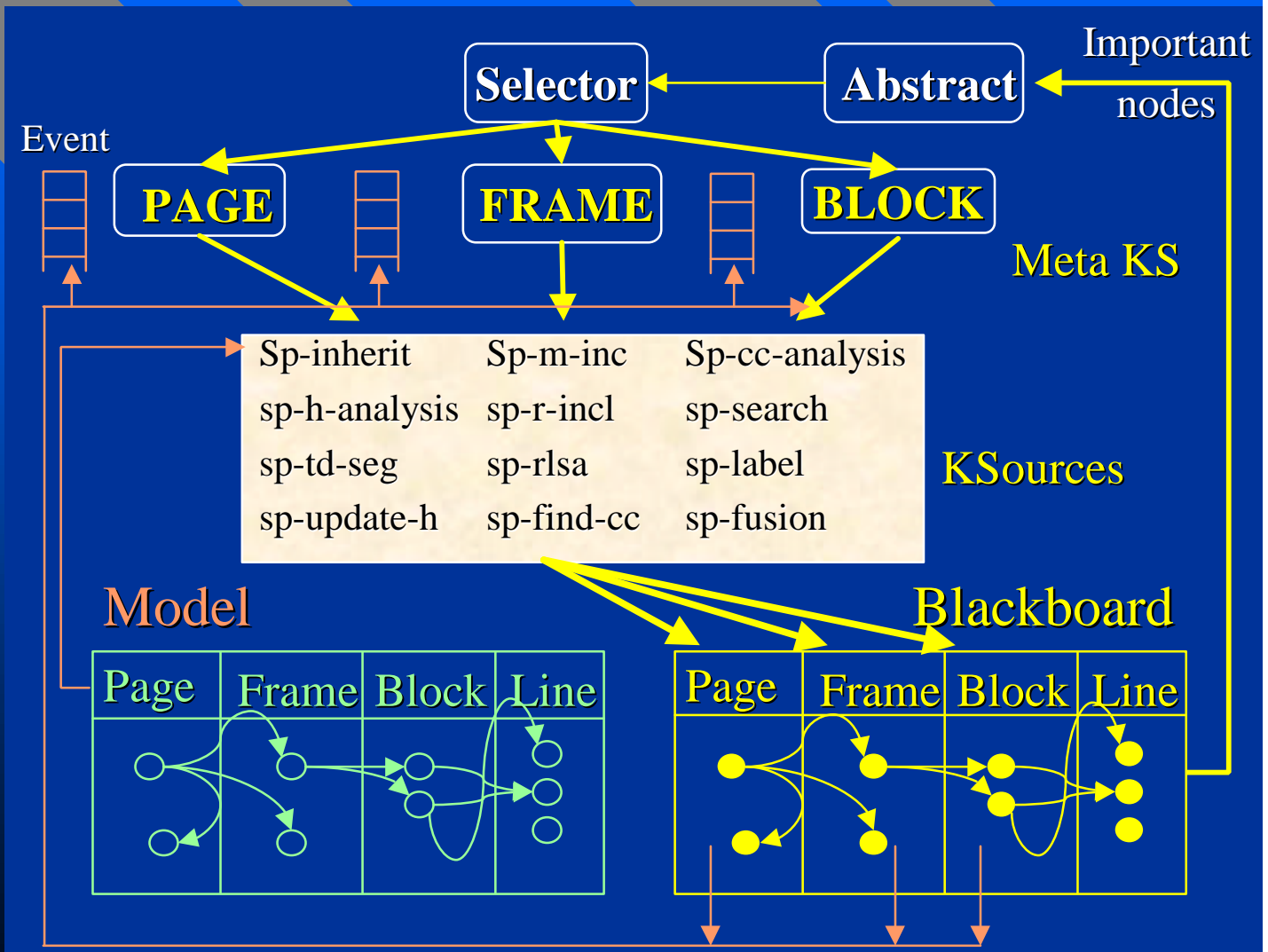
Logical Structure



nd block
y Block
y ou Head

Recognition

Multi-Agent Approach [Chenevoy-Belaïd 90]



Anchor Points

[Valverde-Belaïd 1999]

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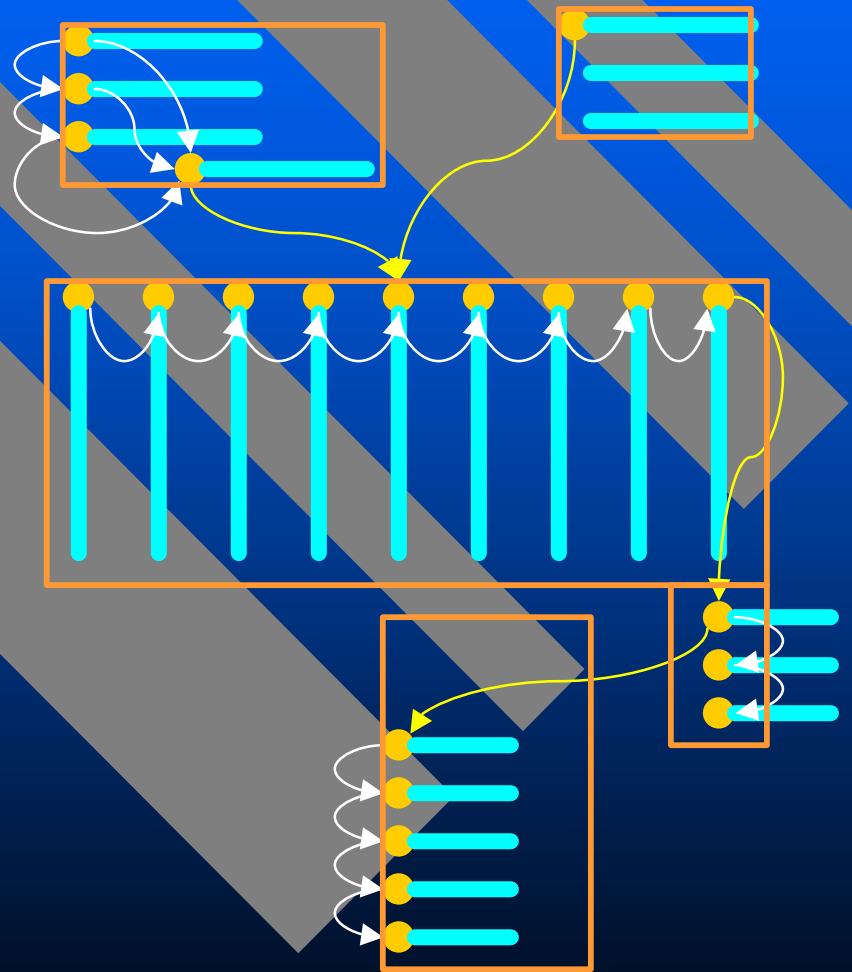
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Conclusion

- **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