



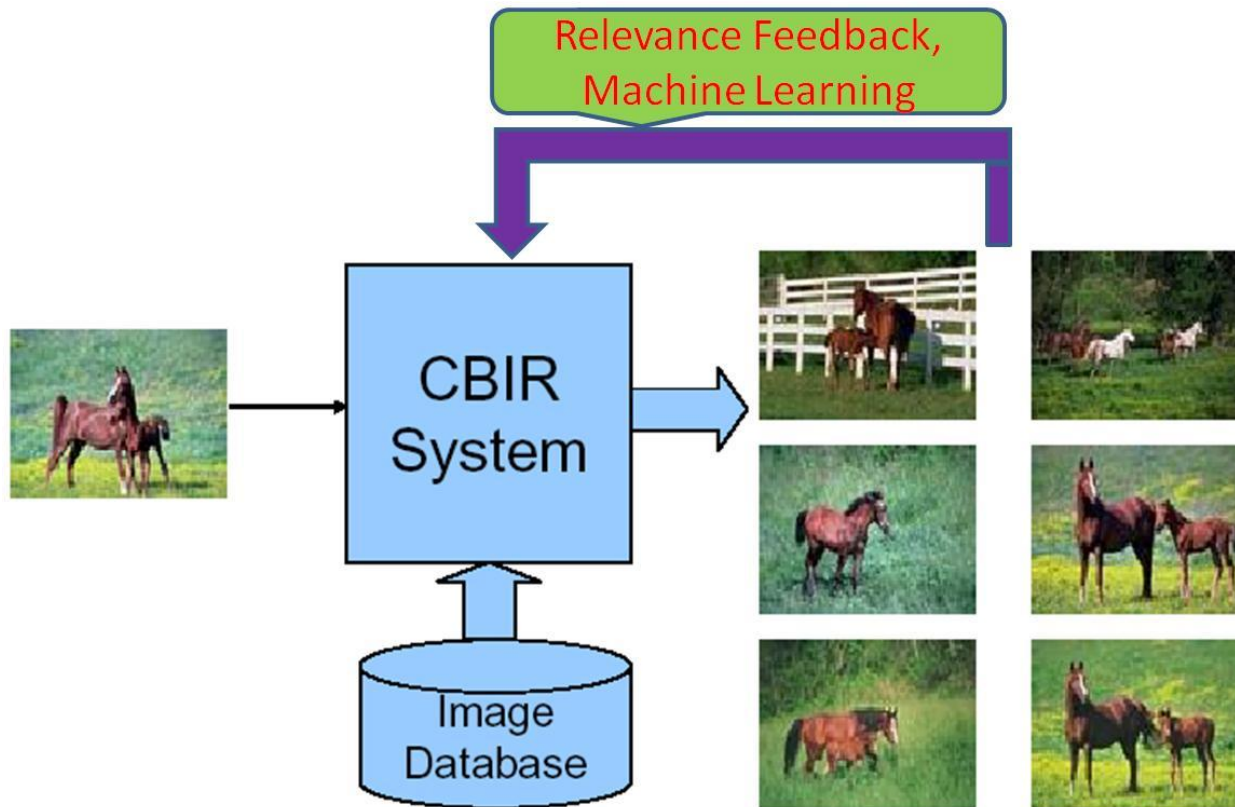
Indexação e Recuperação de Imagens por Conteúdo

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Content-based Image Retrieval (CBIR)



Roteiro

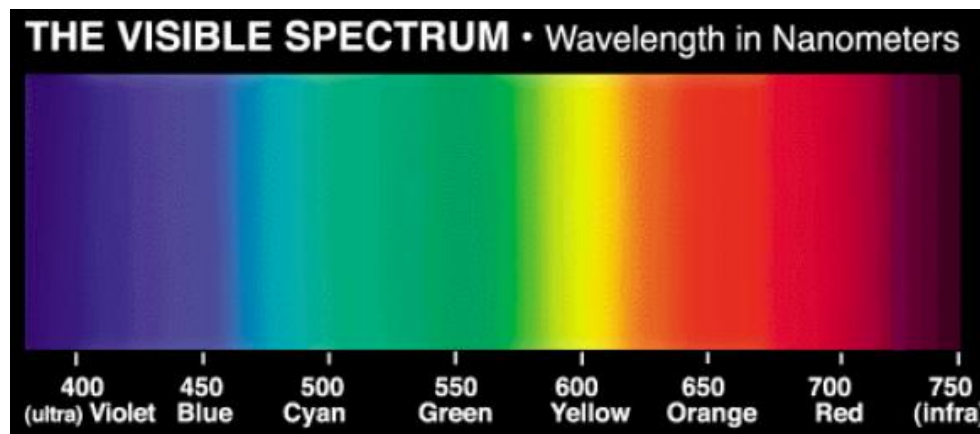
- Introdução
- Arquitetura
- Extração de Características
- Indexação
- Medidas de Similaridades
- Avaliação da qualidade
- Desafios
- Sistemas

Introdução

- Nós somos “criaturas visuais”;
- A maior parte das informações que adquirimos vem dos nossos olhos
- Cerca de 90 a 95% da informação que usamos no dia-a-dia vem do sistema visual

Introdução

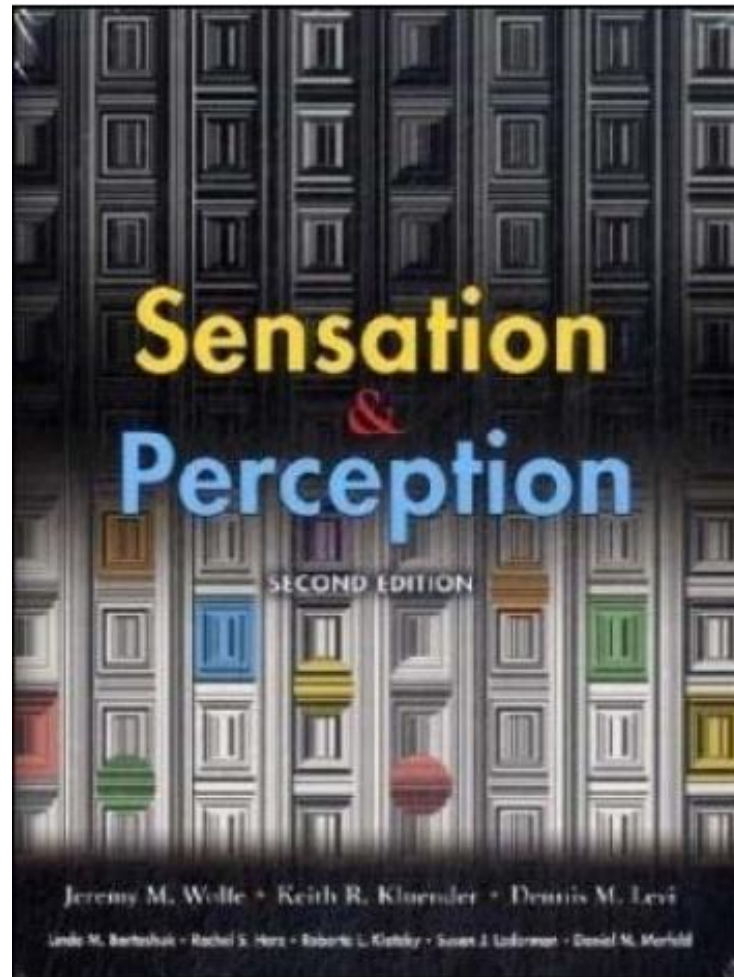
- Nossa visão depende de dois olhos frontais que detectam luz dentro de um conjunto específico de comprimentos de onda
 - Azul ao vermelho
 - Derivado dos primatas



Introdução

- Algumas culturas fixam sua atenção em um (ou poucos) objetos que estão no primeiro plano, ignorando os arredores
- Outras prestam mais atenção na cena completa e nos detalhes do background, notando a presença de objetos no primeiro plano, mas sem devotar muita atenção em seus detalhes
- Também o reconhecimento de um objeto em uma cena diminui (ou aumenta) nossa atenção (ou foco)

Introdução



Introdução

- Com o crescimento dos diversos dispositivos de aquisição de imagens em meios digitais, tanto para uso pessoal quanto equipamentos de uso profissional, surgiu a necessidade do desenvolvimento de técnicas de recuperação;
- Na década de 80 é considerada a etapa inicial dos estudos envolvendo CBIR;

Introdução

- As imagens digitais, entretanto, constituem dados complexos cujo conteúdo pode ser interpretado de diversas maneiras. Com isso podemos levantar diversos questionamento, exemplo:
 - Como interpretar ou representar o conteúdo de uma imagem?
 - Quais medidas que podem caracterizar adequadamente este conteúdo?
 - Como recuperar imagens de um grande repositórios utilizando o conteúdo extraído?
 - Como estabelecer um critério de similaridade entre estas imagens?

Introdução

■ Exemplo

- Um médico diante de um exame pode querer consultar outros exames parecidos com a intenção de reforçar o seu parecer clínico sobre um caso em análise;
- Um hospital-escola, os alunos de medicina podem recuperar imagens similares de diversos pacientes visando compreender o padrão de uma determinada doença.

Introdução

- Os sistemas de recuperação de imagens baseado em conteúdo (CBIR) permitem a recuperação de imagens utilizando características como:
 - Cor;
 - Textura;
 - Forma.

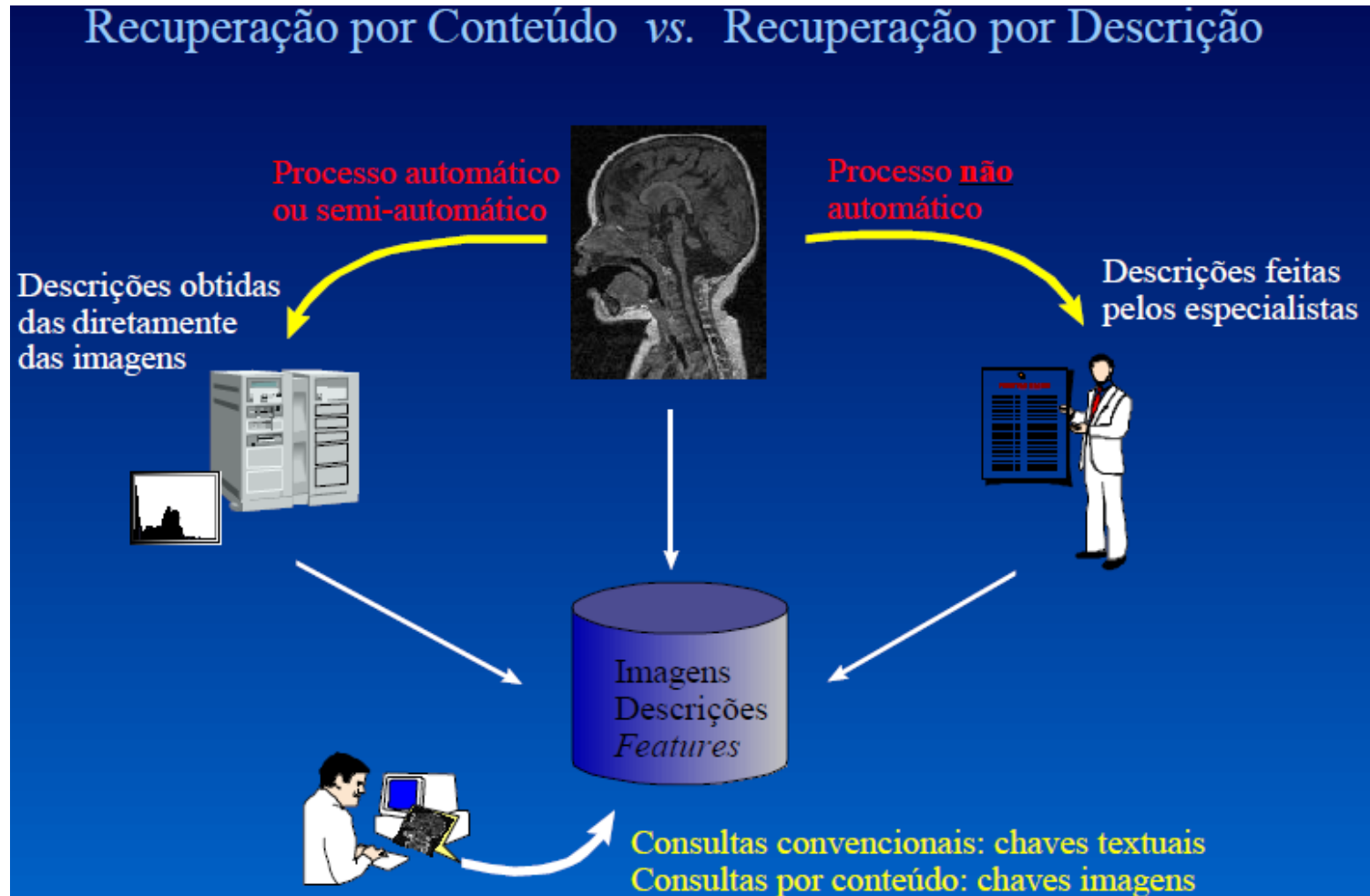
Introdução

- A pesquisa em CBIR pode ser classificada em três tipos:
- Recuperação por desenho (sketch): neste tipo de pesquisa, o usuário esboça uma imagem aproximada daquilo que ele deseja recuperar;
- Recuperação por exemplos (QBE – Query By Example): é a forma mais comum nos sistemas atuais. Nela, o usuário fornece uma imagem de exemplo, similar à qual ele deseja recuperar;

Introdução

- Busca Parametrizada: O usuário fornece parâmetros de busca que descrevem a imagem. Por exemplo, 'buscar imagens com 60% de vermelho e 40% de verde'.

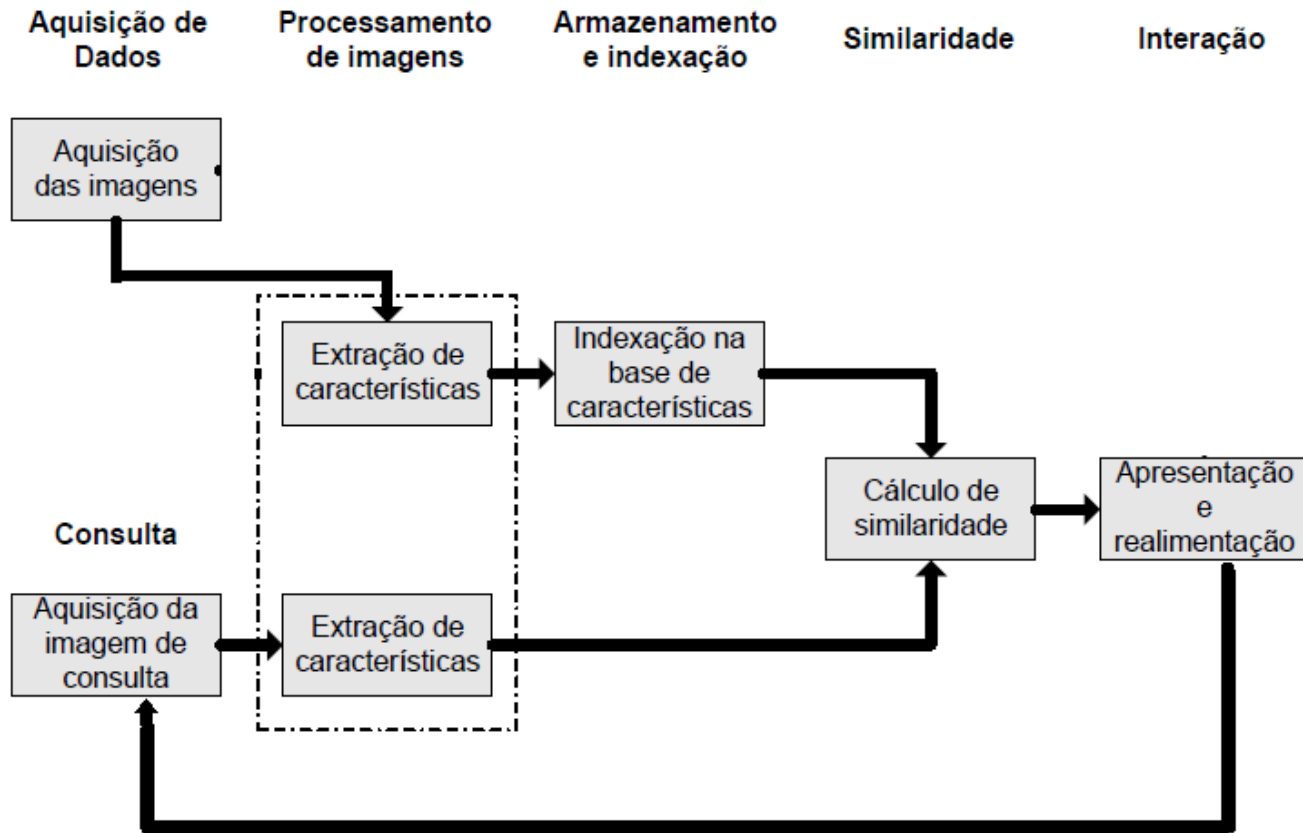
Introdução



Arquitetura

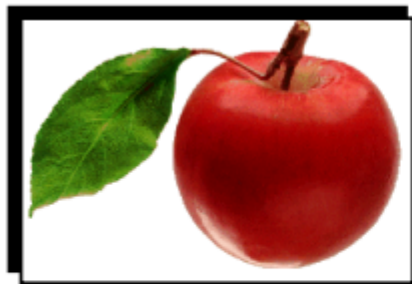
- Os sistemas de recuperação baseada em conteúdo são sempre compostos dos seguintes módulos:
- Interface gráfica de consulta
- Sistema de armazenamento e indexação de dados
- Medida de similaridade
- Extração de características e
- Sistema de recuperação (retrieval engine).

Arquitetura



[Extração de Características]

- Característica é uma função de uma ou mais medidas, calculadas de forma que quantifique alguma propriedade de um objeto.



*Imagem
Original*

**Extração de
Características**



*Vetor de
Características*

X1
X2
⋮
⋮
XN

[Extração de Características]

- Tipos de consultas por conteúdo:
 - Tipo 1 - Extração de características primitivas;
 - “Encontre imagens semelhantes a uma dada imagem”
 - Tipo 2 - Características derivadas com algum grau de inferência lógica
 - “Encontre imagens de bicicletas”
 - Tipo 3 - Características abstratas que envolve raciocínio sobre a intenção do usuário
 - “Encontre imagens de pessoas alegres”

[Extração de Características]

■ Cor

- Características baseadas em cor são as mais utilizadas em recuperação por conteúdo;
- As cores podem ser representadas em diferentes sistemas. Entre eles:
 - RGB (red, green, blue) que é um modelo que mapeia diretamente as características físicas do dispositivo de exibição;
 - HSI (hue, saturation, intensity) que reflete mais precisamente o modelo de cores para a percepção humana.

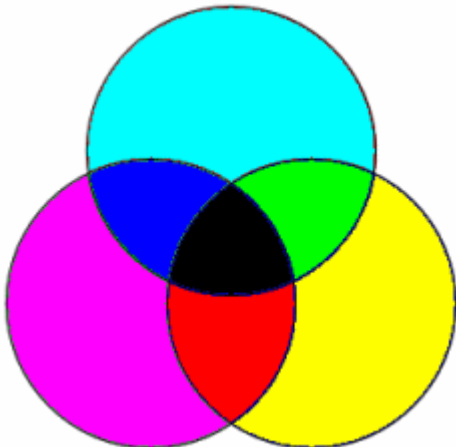
[Extração de Características]

■ Cor

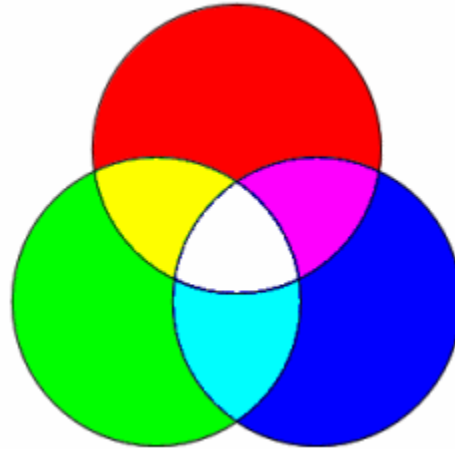
Escala de cinza



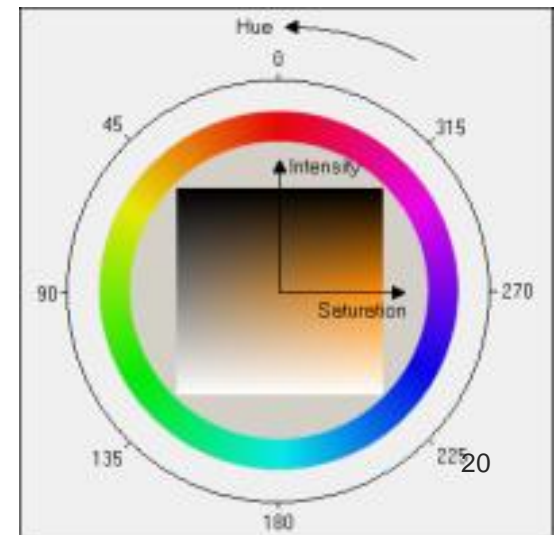
CMYK



RGB



HSI

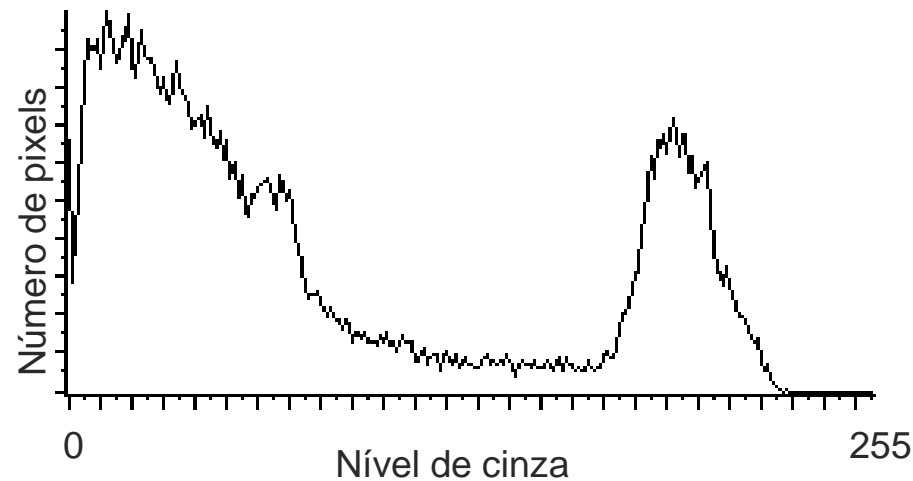


Extração de Características

- Cor
 - Histograma
 - Os histogramas são uma das formas mais usuais de medir a distribuição estatística de cores da imagem e a quantidade de pixel existente para cada cor, pois o cálculo é computacionalmente simples e barato e o histograma não é alterado caso ocorram pequenas alterações.

[Extração de Características]

- Cor
 - Histograma



Extração de Características

■ Cor

○ Histograma

■ Desvantagens

- Não apresenta informação sobre a distribuição espacial das cores. A solução é usar vetor de coerência, correlograma de cor, entropia da distribuição de cores, etc.
- É necessário grande espaço em memória para seu armazenamento. Uma das soluções é usar histograma métrico.

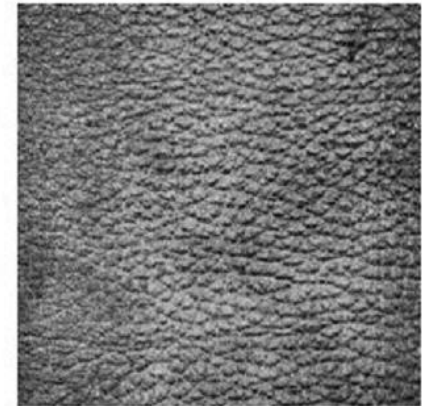
[Extração de Características]

■ Textura

- Textura é um atributo que representa o arranjo espacial dos níveis de cinza dos pixels em uma região
- Entre as técnicas para a extração de características de textura estão os filtros de Gabor e as Transformadas de Wavelets.
- Esses métodos tentam capturar partes da imagem com relação à mudança de direção e escala, e são muito úteis para imagens ou regiões com texturas homogêneas.

[Extração de Características]

- Textura



Extração de Características

■ Textura

- A extração de características de textura pode ser feita por um histograma, porém não se deve analisar somente a distribuição de intensidade de cores da imagem, mas também as posições relativas aos “pixels” com valores de intensidade iguais ou similares.

Extração de Características

■ Textura

- O histograma de segunda ordem (matriz de co-ocorrência) é uma representação da distribuição de probabilidade de ocorrência de um par de valores semelhantes separados por uma distância.
- A estatística desse histograma, como por exemplo, entropia, inércia e energia, correlacionam-se com as estruturas da imagem.

Extração de Características

■ Forma

- Toma como base a estrutura física dos objetos da imagem. Utiliza segmentação.



- Segmentação

- processo de dividir uma imagem digital em múltiplas regiões (conjunto de pixels) ou objetos;
- O objetivo é extrair objetos da imagem.



Extração de Características

- Forma
 - Segmentação

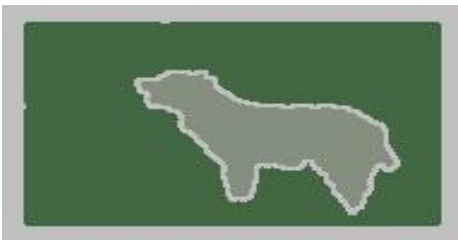


Figure 5. Segmentation of randomly selected images of tigers, cheetahs, leopards, zebras, airplanes, and bald eagles. Boundaries

[Extração de Características]

■ Forma

- Após a segmentação, os segmentos resultantes podem ser descritos como vetores de características de forma que podem ter dimensão fixa ou variável.
- Métodos:
 - Curvature scale space;
 - Momentos de Zernike;
 - Transformada de Fourier.

Técnicas de indexação multidimensional

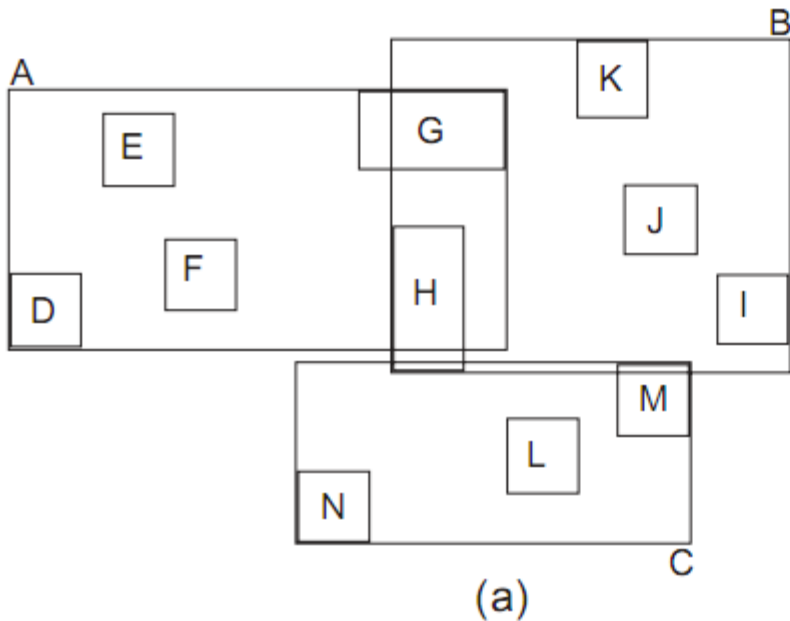
- Entre as técnicas de indexação multidimensional destacam-se:
 - Bucketing algorithm;
 - Kd-tree;
 - Priority k-d tree;
 - Quad-tree,
 - KD-B tree,
 - HB-tree;
 - R-tree e suas variantes RC-tree e R⁺-tree

Técnicas de indexação multidimensional

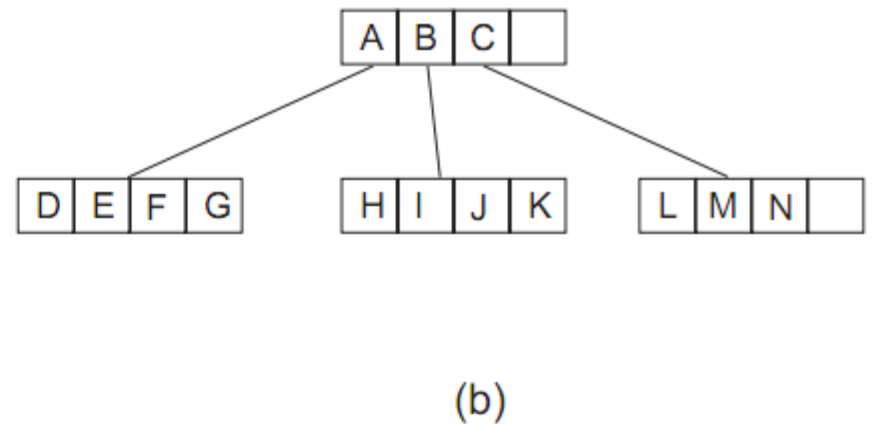
- R-Tree
 - O método R-tree é uma estrutura hierárquica baseada no método B-tree que permite a organização dinâmica de um conjunto de elementos geométricos de dimensão d pela representação de retângulos envolventes mínimos.

Técnicas de indexação multidimensional

■ R-Tree



Distribuição espacial



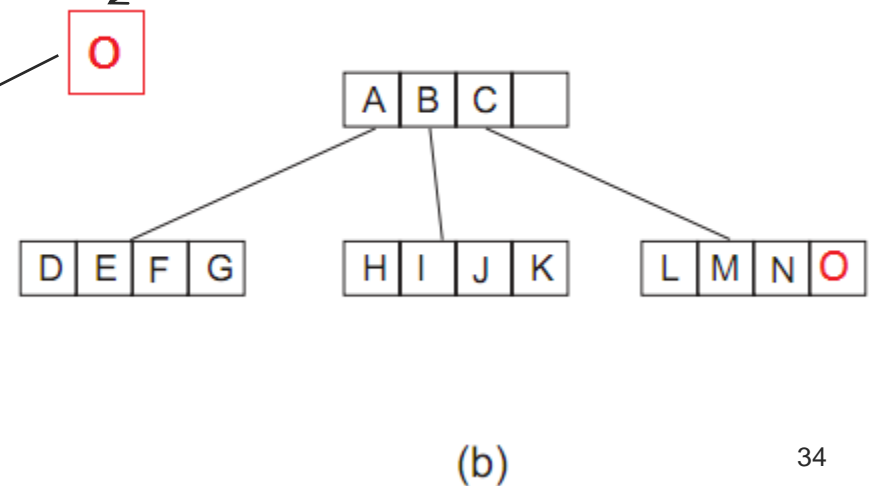
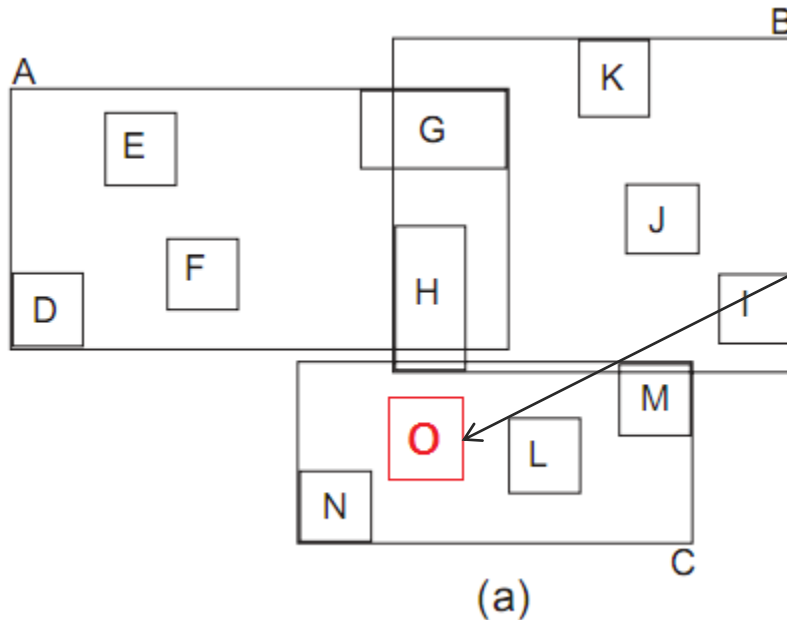
Estrutura lógica

Técnicas de indexação multidimensional

- R-Tree
 - Inserção



Vetor de característica



Medidas de Similaridade

- Distância Euclidiana

$$E(x, y) = \sqrt{\sum_{a=1}^n (x_a - y_a)^2}$$

- Euclidiana Normalizada

$$En(x, y) = \sqrt{\sum_{a=1}^n \left(\frac{|x_a - y_a|}{\max(a) - \min(a)} \right)^2}$$

- Manhattan (city-block)

$$D(x, y) = \sum_{a=1}^n |x_a - y_a|$$

- Chebychev

$$D(x, y) = \max_{a=1}^n |x_a - y_a|$$

- Camberra

$$D(x, y) = \sum_{a=1}^n \frac{|x_a - y_a|}{|x_a + y_a|}$$

Medidas de Similaridade

■ Distância de Hamming

$$H(x, y) = \sum_{a=1}^n h_a(x_a, y_a) \quad h_a(x_a, y_a) = \begin{cases} 1, & \text{se } x_a \neq y_a \\ 0, & \text{se } x_a = y_a \end{cases}$$

■ VDM – *Value Difference Metric*

- Semelhança entre as distribuições das classes

$$VDM(x, y) = \sqrt{\sum_{a=1}^n vdm_a(x_a, y_a)}$$

$$vdm_a(x, y) = \sum_{c=1}^C \left| \frac{N_{a,x,c}}{N_{a,x}} - \frac{N_{a,y,c}}{N_{a,y}} \right|^q = \sum_{c=1}^C |P_{a,x,c} - P_{a,y,c}|^q$$

[Avaliação da qualidade]

- Matriz de confusão;

	Exemplo Positivo	Exemplo Negativo
Classificado como Positivo	Verdadeiro Positivo	Falso Positivo
Classificado como Negativo	Falso Negativo	Verdadeiro Negativo

[Avaliação da qualidade]

- Taxa de verdadeiros positivos

$$\frac{VP}{VP + FN}$$

- Taxa de falsos positivos

$$\frac{FP}{FP + VN}$$

[Avaliação da qualidade]

- Revocação

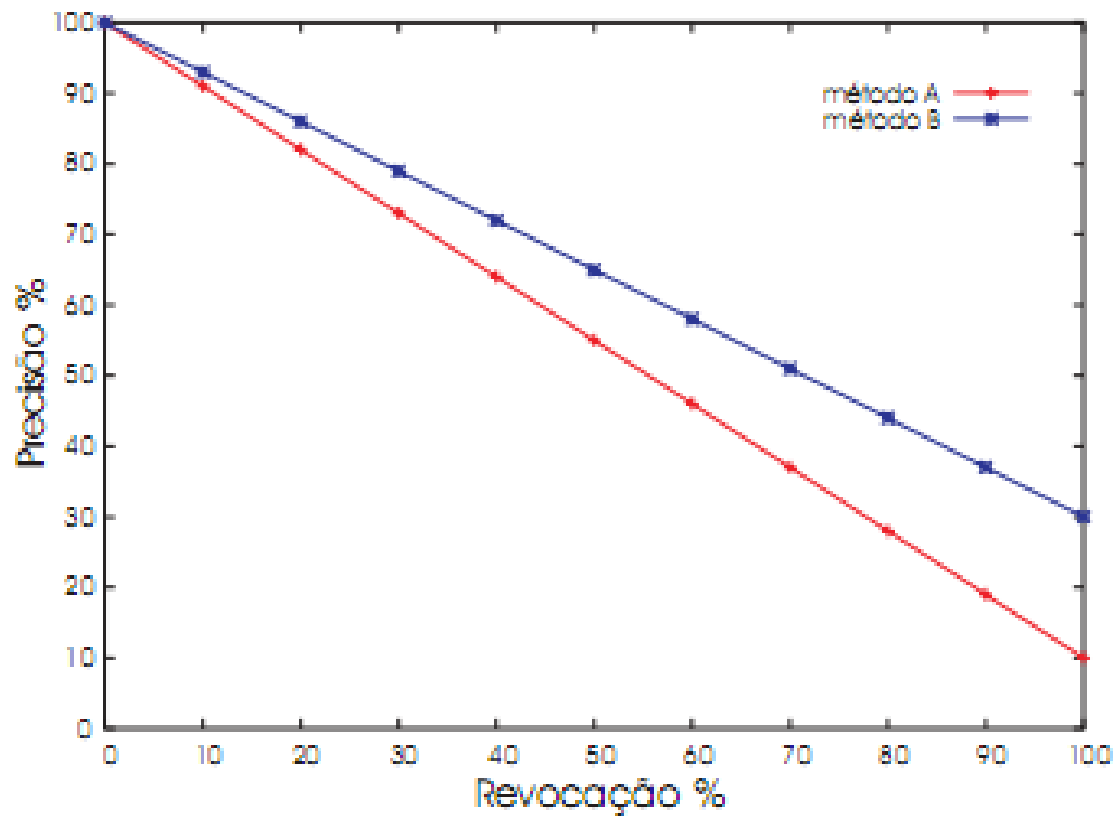
$$\frac{VP}{VP + FN}$$

- Precisão

$$\frac{TP}{TP + FP}$$

Avaliação da qualidade

■ Curva ROC



[Desafios]

- Semantic Gap;
- Grande volume de dados;
- Descoberta de novas relações e mineração de padrões;
- Novas interfaces e técnicas de visualização de informação para anotação;
- ...

Sistemas CBIR

- FIDS (*Flexible Image Database System*)
- QBIC (*Query By Image Content*)
- ALIPR (*Automatic Linguistic Indexing of Pictures - Real Time*)
- BIRAM (Base de Imagem Relacional de Algoritmo e Métricas)
- SIMPLIcity (*Semantics-Sensitive Integrated Matching for Picture Libraries*)
- SQUID (*Shape Queries Using Image Databases*)
- Surfimage
- ADL (*Alexandria Digital Library*)
- CalPhotos
- ...

FIDS - *Flexible Image Database System*

[FIDS - *Flexible Image Database System*]

- FIDS permite ao usuário consultar o banco de dados com base em complexas combinações de medidas de distância pré-definidas.

FIDS - Flexible Image Database System

demo: Fids

Fids demo



Put In Cart

Check Out

◀ Random Go ZoomIn ▶ Get random images ...

distance measures loose ... strict

<input type="checkbox"/> ColorHistL_14x4x4	<input type="checkbox"/>	5	<input checked="" type="radio"/> And <input type="radio"/> Or <input type="radio"/> Sum
<input checked="" type="checkbox"/> ColorHist8x8x8	<input type="checkbox"/>	5	
<input type="checkbox"/> SobelEdgeHist	<input type="checkbox"/>	5	
<input type="checkbox"/> LBPHist	<input type="checkbox"/>	5	
<input type="checkbox"/> fleshiness	<input type="checkbox"/>	5	
<input type="checkbox"/> Wavelets	<input type="checkbox"/>	5	

A double click on an image means:
 Set query / Go
 Zoom in

Server Connected

FIDS - Flexible Image Database System

demo: Fids

Fids demo



Put In Cart

Check Out

Random Go ZoomIn Get random images ...

distance measures loose ... strict

<input type="checkbox"/> ColorHistL14x4x4	<input type="checkbox"/>	5	<input checked="" type="radio"/> And <input type="radio"/> Or <input type="radio"/> Sum
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<input type="checkbox"/> SobelEdgeHist	<input type="checkbox"/>	5	
<input type="checkbox"/> LBPHist	<input type="checkbox"/>	5	
<input type="checkbox"/> fleshiness	<input type="checkbox"/>	5	
<input type="checkbox"/> Wavelets	<input type="checkbox"/>	5	

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Server Connected

FIDS - Flexible Image Database System

demo: Fids

Fids demo

The screenshot displays the FIDS demo interface. At the top, a browser window title bar shows "demo: Fids". Below it, the text "Fids demo" is displayed in red. The main area features a grid of six image thumbnails. The top-left thumbnail is highlighted with a red border. To the right of the grid is a vertical scroll bar and a "Put In Cart" button, which is also highlighted with a red border. Below the "Put In Cart" button is a "Check Out" button. At the bottom of the grid, there is a control bar with "Random", "Go", and "ZoomIn" buttons, followed by the text "Found 147 matches. Displaying 1 - 6". Below the control bar is a list of distance measures with checkboxes and sliders. The "ColorHist8x8x8" and "LBPHist" measures are checked. To the right of the distance measures are radio buttons for "And", "Or", and "Sum", with "Sum" selected. A text box on the right contains the instruction "A double click on an image means:" followed by radio buttons for "Set query / Go" (selected) and "Zoom in".

Found 147 matches. Displaying 1 - 6

distance measures loose ... strict

<input type="checkbox"/> ColorHistL14x4x4		5	<input type="radio"/> And
<input checked="" type="checkbox"/> ColorHist8x8x8		5	<input type="radio"/> Or
<input type="checkbox"/> SobelEdgeHist		5	<input checked="" type="radio"/> Sum
<input checked="" type="checkbox"/> LBPHist		5	
<input type="checkbox"/> fleshiness		5	
<input type="checkbox"/> Wavelets		5	

A double click on an image means:

- Set query / Go
- Zoom in

FIDS - Flexible Image Database System

demo: Fids

Fids demo

Found 147 matches. Displaying 1 - 6

distance measures loose ... strict

<input type="checkbox"/> ColorHistL14x4x4		5	<input type="radio"/> And <input type="radio"/> Or <input checked="" type="radio"/> Sum
<input checked="" type="checkbox"/> ColorHist8x8x8		5	
<input type="checkbox"/> SobelEdgeHist		5	
<input checked="" type="checkbox"/> LBPHist		5	
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demo: Fids

Fids demo

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<input type="checkbox"/> ColorHistL14x4x4		5	<input type="radio"/> And
<input checked="" type="checkbox"/> ColorHist8x8x8		5	<input type="radio"/> Or
<input type="checkbox"/> SobelEdgeHist		5	<input checked="" type="radio"/> Sum
<input checked="" type="checkbox"/> LBPHist		5	
<input type="checkbox"/> fleshiness		5	
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A double click on an image means:

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FIDS - Flexible Image Database System

demo: Fids

Fids demo

The screenshot displays the FIDS demo interface. At the top, a browser window title bar shows "demo: Fids". Below it, the text "Fids demo" is written in red. The main area features a grid of six image thumbnails. The top-left thumbnail is highlighted with a red border. To the right of the grid is a vertical scrollbar and two buttons: "Put In Cart" and "Check Out". Below the grid, a status bar indicates "Found 147 matches. Displaying 1 - 6". Underneath the status bar, there are search controls: "Random", "Go", "ZoomIn", and "ZoomOut". A list of distance measures is shown, each with a checkbox and a slider. The "ColorHist8x8x8" and "LBPHist" measures are checked. To the right of the distance measures, there are radio buttons for "And", "Or", and "Sum", with "Sum" selected. A text box on the right contains the instruction "A double click on an image means:" followed by radio buttons for "Set query / Go" (selected) and "Zoom in".

Found 147 matches. Displaying 1 - 6

distance measures loose ... strict

<input type="checkbox"/> ColorHistL14x4x4		5	<input type="radio"/> And
<input checked="" type="checkbox"/> ColorHist8x8x8		5	<input type="radio"/> Or
<input type="checkbox"/> SobelEdgeHist		5	<input checked="" type="radio"/> Sum
<input checked="" type="checkbox"/> LBPHist		5	
<input type="checkbox"/> fleshiness		5	
<input type="checkbox"/> Wavelets		5	

A double click on an image means:

- Set query / Go
- Zoom in

FIDS - Flexible Image Database System

demo: Fids

Fids demo

The screenshot displays the FIDS demo interface. At the top, a browser window title bar shows "demo: Fids". Below it, the text "Fids demo" is displayed in red. The main area features a grid of six image thumbnails. The top-left thumbnail is highlighted with a red border. To the right of the grid is a vertical image viewer showing the selected image, with "Put In Cart" and "Check Out" buttons below it. At the bottom of the grid, a search control bar includes "Random", "Go", "Zoom In", and "Zoom Out" buttons, with "Found 147 matches. Displaying 1 - 6" text. Below the search bar, a list of distance measures is shown with checkboxes and sliders:

Distance Measure	loose ... strict	Value
<input type="checkbox"/> ColorHistL14x4x4		5
<input checked="" type="checkbox"/> ColorHist8x8x8		5
<input type="checkbox"/> SobelEdgeHist		5
<input checked="" type="checkbox"/> LBPHist		5
<input type="checkbox"/> fleshiness		5
<input type="checkbox"/> Wavelets		5

Below the distance measures, there are radio buttons for "And", "Or", and "Sum", with "Sum" selected. A text box on the right contains the instruction: "A double click on an image means:
 Set query / Go
 Zoom in"

FIDS - Flexible Image Database System

demo: Fids

Fids demo

The screenshot displays the FIDS demo interface. At the top, a search bar contains the text "demo: Fids". Below it, the title "Fids demo" is shown in red. The main area features a grid of six image thumbnails. The first thumbnail in the top row is highlighted with a red border. To the right of the grid is a vertical image viewer showing a larger version of the selected image, with "Put In Cart" and "Check Out" buttons below it. At the bottom, a navigation bar includes "Random", "Go", "ZoomIn", and "ZoomOut" buttons, followed by the text "Found 147 matches. Displaying 1 - 6". Below the navigation bar is a "distance measures" panel with a red border, containing a list of features with checkboxes and sliders:

distance measures	loose ... strict	
<input type="checkbox"/> ColorHistL14x4x4		5
<input checked="" type="checkbox"/> ColorHist8x8x8		5
<input type="checkbox"/> SobelEdgeHist		5
<input checked="" type="checkbox"/> LBPHist		5
<input type="checkbox"/> fleshiness		5
<input type="checkbox"/> Wavelets		5

To the right of the distance measures panel are radio buttons for "And", "Or", and "Sum", with "Sum" selected. Further right is a box titled "A double click on an image means:" with radio buttons for "Set query / Go" (selected) and "Zoom in".

FIDS - Flexible Image Database System

demo: Fids

Fids demo

The screenshot displays the FIDS demo interface. At the top, a browser window shows the URL "demo: Fids". Below the browser window, the text "Fids demo" is displayed in red. The main area shows a grid of six search results for a query image (a cherry blossom tree). The first image in the top-left corner is highlighted with a red border. To the right of the grid is a larger view of the selected image, with "Put In Cart" and "Check Out" buttons below it. At the bottom, there is a navigation bar with "Random", "Go", and "ZoomIn" buttons, and the text "Found 147 matches. Displaying 1 - 6". Below the navigation bar is a list of distance measures with checkboxes and a range slider. The range slider is currently set to "loose ... strict" and is highlighted with a red border. The distance measures are: ColorHistL14x4x4 (unchecked), ColorHist8x8x8 (checked), SobelEdgeHist (unchecked), LBPHist (checked), fleshiness (unchecked), and Wavelets (unchecked). To the right of the distance measures are radio buttons for "And", "Or", and "Sum", with "Sum" selected. A text box on the right contains the instruction "A double click on an image means:" with radio buttons for "Set query / Go" (selected) and "Zoom in".

Found 147 matches. Displaying 1 - 6

distance measures

- ColorHistL14x4x4
- ColorHist8x8x8
- SobelEdgeHist
- LBPHist
- fleshiness
- Wavelets

loose ... strict

And

Or

Sum

A double click on an image means:

- Set query / Go
- Zoom in

FIDS - Flexible Image Database System

demo: Fids

Fids demo

The interface displays a grid of six image search results. The top-left image is highlighted with a red border. To the right, a larger view of the same image is shown with navigation arrows and a 'Put In Cart' button. Below the grid, a status bar indicates 'Found 147 matches. Displaying 1 - 6' and includes 'Random', 'Go', and 'ZoomIn' buttons.

distance measures loose ... strict

<input type="checkbox"/> ColorHistL14x4x4		5
<input checked="" type="checkbox"/> ColorHist8x8x8		5
<input type="checkbox"/> SobelEdgeHist		5
<input checked="" type="checkbox"/> LBPHist		5
<input type="checkbox"/> fleshiness		5
<input type="checkbox"/> Wavelets		5

And
 Or
 Sum

A double click on an image means:
 Set query / Go
 Zoom in

QBIC - *Query By Image Content*

[QBIC - *Query By Image Content*]

- QBIC permite consultas baseadas em imagens de exemplo, esboço construído pelo usuário e/ou padrões de cor e textura selecionados.

QBIC - Query By Image Content

The State Hermitage Museum: Digita...

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SEARCH RESULTS


1) [Boats at Saintes-Maries](#)

 Gogh, Vincent van 1888


2) [Stained Glass Panel: Antichrist Making a Fiery Storm \(10a\)](#)

 UNKNOWN
Late 14th century
(?)


3) [Portrait of Mikhail N. Rvlev \(1771-1831\) \(1st\)](#)

 Dawe, George 1824


4) [Peonies](#)

 Girieud, Pierre Paul 1906


5) [Portrait of Yefim I. Chaplits \(1768-1825\)](#)

 Dawe, George
No later than 1825


6) [Portrait of Pyotr A. Kosen \(1778-1853\)](#)

 Dawe, George 1823

7) [Portrait of Ivan L. Shakhovskoy \(1776-1860\)](#)



8) [Portrait of Ivan I. Palitsyn \(1763-1814\)](#)



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natural cloud landscape winter snow mountain
alps europe - similar »



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| <input type="checkbox"/> engine | <input type="checkbox"/> indoor | <input type="checkbox"/> balloon | <input type="checkbox"/> landscape | <input type="checkbox"/> people |
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Narrow down: plant macro garden natural orange spring food rose fruit sunflower animal yellow color ... » [def] flower page: 1/10



The image shows a grid of 15 flower-related images. Each image is accompanied by a small icon and the text "/ Related / Similar". The images include: a red and white flower, a yellow sunflower, a purple daisy, a red and orange flower, a yellow rose, a black and white rose, an orange rose, a purple flower, a yellow flower, a black and white flower, a red rose, a yellow flower, a pink flower, a yellow flower, and a purple flower.

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Visually similar pictures. page: 1/

The image displays a grid of 15 visually similar flower images. Each image is accompanied by a small icon and the text 'Related / Similar'. The images include various types of flowers such as purple crocuses, purple orchids, purple daisies, pink flowers, and a bee on a purple flower.

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Related pictures. sigma florida macro flower... page: 1/11

Each image in the grid is accompanied by a small icon and the text "Related / Similar".

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The image displays a grid of 15 dragonfly photographs arranged in three rows of five. Each photograph is accompanied by a small circular icon containing a magnifying glass and the text "/ Related / Similar". The dragonflies shown include various species and colors, such as purple, green, blue, brown, and orange, in different natural settings like reeds, leaves, and water.

page: 1 2 3 4 5 6 7 8 9 10

BIRAM - Base de Imagem Relacional de Algoritmo e Métricas

BIRAM - Base de Imagem Relacional de Algoritmo e Métricas

- Protótipo desenvolvido em Java, que permite a utilização de diferentes algoritmos para a busca e recuperação de imagens por conteúdo.

BIRAM - Base de Imagem Relacional de Algoritmo e Métricas

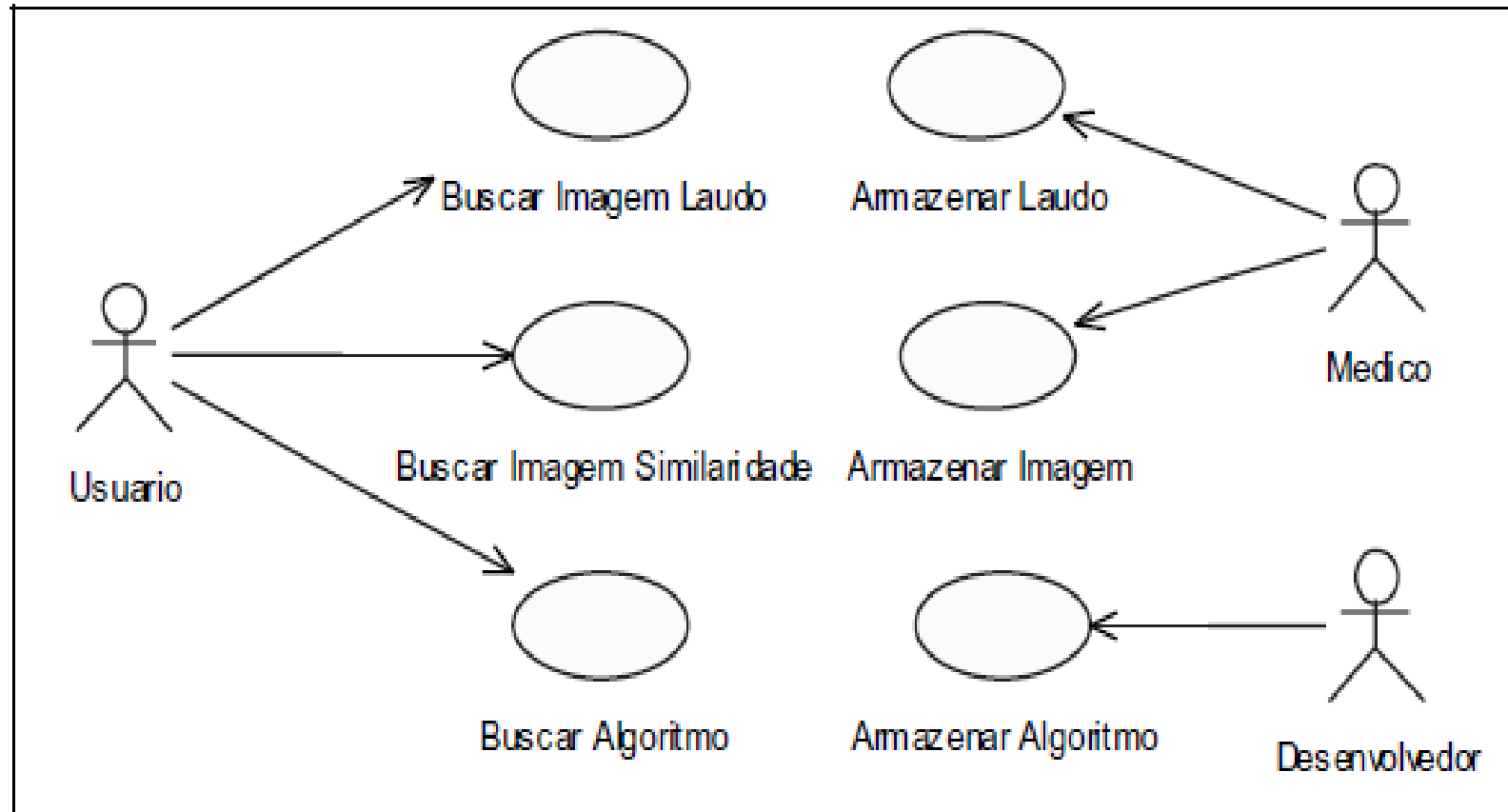


Figura 1 – Casos de uso do BIRAM



Figura 4 – Visualização de laudos



Figura 5 – Atribuição de uma conclusão ao laudo

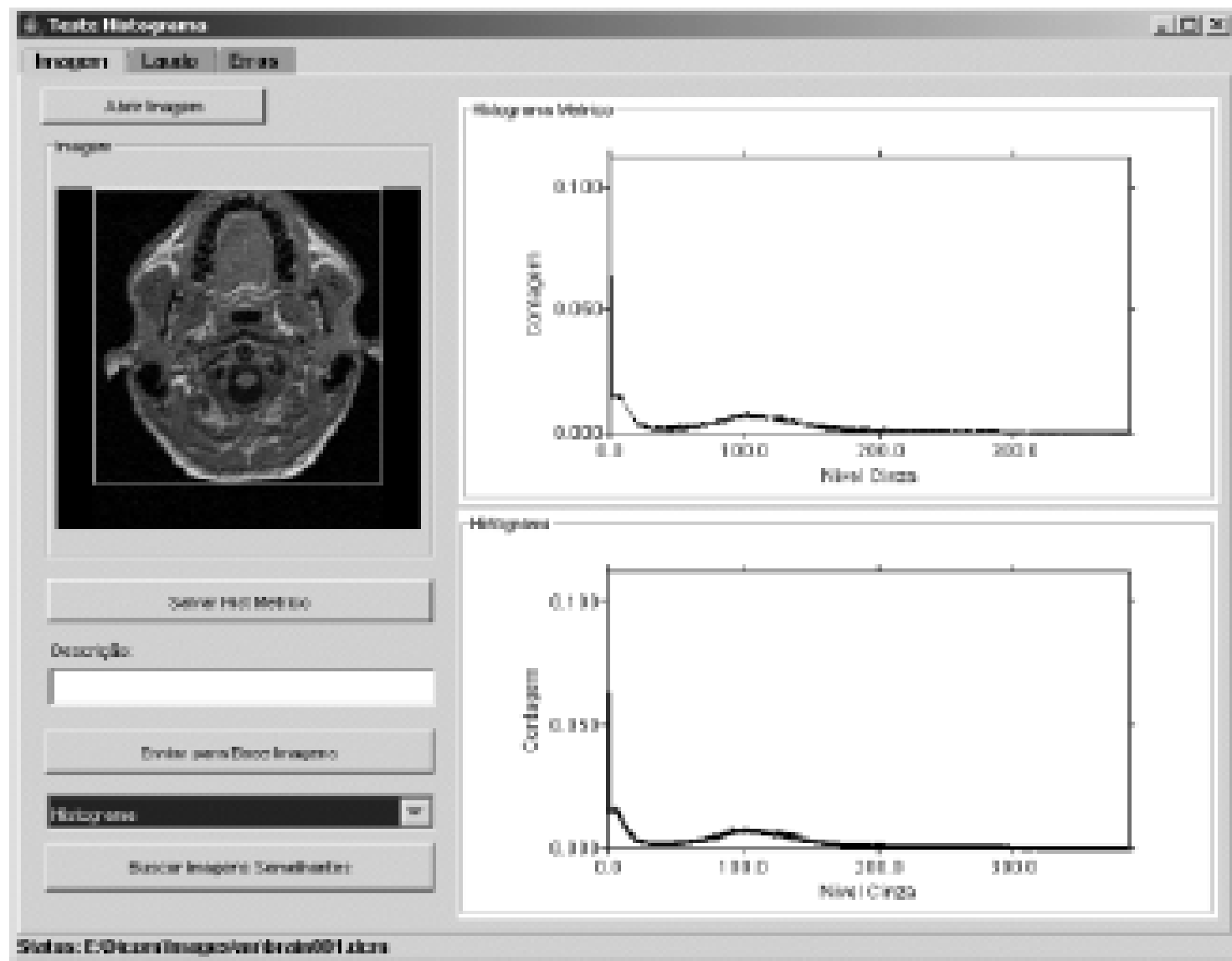


Figura 6 – Tela de busca de imagens semelhantes



Figura 7 – Resultado de pesquisa utilizando histograma métrico

Referências

- TORRES, R.S. and FALCÃO, A. X. *Content-Based Image Retrieval: Theory and Applications*. In: RITA, Volume XIII, Nº 2, 2006
- RAZENTE, H. L. Adequando consultas por similaridade para reduzir a descontinuidade semântica na recuperação de imagens por conteúdo. São Carlos – SP, 2006 (tese de doutorado).
- COMER, M. L. and DELP, E. J. *The EM/MPM Algorithm for Segmentation of Textured Images: Analysis and Further Experimental Results*. In: IEEE TRANSACTIONS ON IMAGE PROCESSING, VOL. 9, Nº. 10, 2000.
- BALAN, A. G. R.; TRAINA, A. J. M.; TRAINA, C. Jr.; MARQUES, P. M. A. Integrando Textura e Forma para a Recuperação de Imagens por Conteúdo.
- MORENO, R. A. ; FURUIE, S. S. . BIRAM: Sistema para Recuperação de Imagens por Conteúdo. In: X Congresso Brasileiro de Informática em Saúde, 2006, Florianópolis. Anais do X Congresso Brasileiro de Informática em Saúde, 2006. p. 554-559.

Referências

- FIDS: <http://www.cs.washington.edu/research/imagedatabase/demo/fids/>
- QBIC: <http://www.hermitagemuseum.org/cgi-bin/db2www/qbicColor.mac/qbic?selLang=English>
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Indexação e Recuperação de Imagens por Conteúdo

Perguntas?