DICOM MEDICAL IMAGE RETRIEVAL USING DEEP LEARNING ARCHITECTURE

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Abstract— *In this paper, a system is presented that locates reference tag sand image processing for DCM image retrieval. This technique performs the tag matching directly in the images bypassing parameter recognition and using classes as queries. First, it makes use of DCM image processing techniques, in order to extract powerful features for the description of the tag of the images. The features used for the comparison are capable of capturing the general shape of the query and its classes based on tags of the image. In order to demonstrate the effectiveness of our system, we used a collection of 22 classes in the data base and we trained all classes by tags and image classification by deep learning algorithm used to gain the rate of retrieval in the MATLAB GUI.*

Keywords—DICOM, Image retrival, MATLAB GUI

1. INTRODUCTION

The use of standards like Digital Imaging and Communications in Medicine (DICOM) allows convenient and reliable interchange of information in the medical context. DICOM Structured Reporting (SR) is a concept for encoding reports in a standardized format. This offers the probability of further data mining and automatic clarification. Because of the more advantages, the Integrating the Healthcare Enterprise (IHE) employs DICOM SR in several integration profiles. DICOM SR has become a standard format for exchanging CAD results in clinical environments, e.g., for mammography, which can be stored to PACS. But DICOM SR does not ensure full compatibility with components storing and representing a DICOM SR. The reason is the high flexibility of SR documents. As a consequence, the interoperability of SR documents is restricted to those document structures that are known to the processing components. This is achieved by DICOM SR templates that set up allowed patterns of content and define constraints. DICOM SR standard templates are designed for different application areas. Working group 15 concentrates on computer-aided detection templates and developed among others templates for mammography and chest CAD. Other working groups established templates for procedure reports, radiation dose, general purposes etc. DICOM SR standard templates have been iterated, checked and revised several times by many people of different professional background.

2. LITERATURE SURVEY:

1. The Relationship of Discrete DCM and Directed Information in fMRI based Causality Analysis

AUTHOR: Zhe Wang, Yuan Liang, David C. Zhu and Tongtong Li

ABSTRACT: This paper analyzes the restrictive equivalence between discrete DCM (DDCM) and directed information (DI) for fMRI based element investigated. First, we briefly revisit the DDCM and its relationship with the regular extended time DCM. Second, we confirm the restrictive equivalence between DDCM and directed information DI in characterizing the usual relationship and analyzing the causal side of two brain regions under on the fMRI data. Third, we show that the directed information DI-based usual relationship between the microstates of two brain regions is equal to that between the realized BOLD signals. More particularly, in the noise free case, the directed information DI inference is invariant basic hemodynamic complexity as long as the system is invertible. The theoretical conclusion is established utilizing

fMRI information attained under both resting state and stimulus based state. Our numerical investigative is rational with that reported in previous study. Our conclusions further proving the confluence or conditional equivalences among existing causality investigative tools.

2. Facial Sketch Synthesis Using Two-dimensional Direct Combined Model-based Face-Specific Markov Network

AUTHOR: Ching-Ting Tu*, Yu-Hsien Chan, and Yi-Chung Chen

ABSTRACT: A facial sketch fusion system is suggest featuring a two-dimensional direct integrate model (2DDCM)-based facespecific Markov network. In difference to actual facial sketch synthesis systems, the suggest plan aims to fusion sketches which reproduce the unique drawing style of a specific artist, where this drawing style is the learned from a dataset consisting of a large number of the image/sketch pairwise of training samples.

The fusion system constitute three modules, namely a three module is global module, a local module, and an enhancement module. The global module applies a 2DDCM contact to fusion the global facial geometry and appearance of the input image.

The detailed appearance is then including to the fusion sketch in a local patch-based manner utilizing a parametric 2DDCM model and a non-parametric is Markov random field (MRF) network. Particularly, the MRF approach provide the synthesized conclusion texture more rational with the drawing style of the training samples, while the 2DDCM approach enables the fusion of deliver with a more derivative style. As a conclusion, the similarity between the synthesized sketches and the input images is a extremely improved. Finally, a post-processing performance is performed to enhance the shadowed regions of the synthesized image by including strong lines or curves to emphasize the lighting conditions. The preliminary conclusions prove that the synthesized facial images are in good valuable and quantitative agreement with the input images as well as the ground-truth sketches presented by the same artist. The representing power of the suggested structure is established by synthesizing facial sketches from input images with a wide variety of facial poses, lighting restrictions, and races the even when such images are a not added in the training data set. Moreover, the practical applicability of the suggested structure is established by means of automatic facial recognition tests.

3. Improved Performance of Soft Decision Decoding for DCM in MB-OFDM System

AUTHOR: Jee-Hye Lee, Myung-Sun Baek, and Hyoung-Kyu Song

ABSTRACT In this letter, the soft decision decoding technique utilizing CSI (Channel state information) for DCM that is utilized for high data rate (320, 400, 480 Mbps) in MBOFDM (Multi-Band Orthogonal frequency division multiplexing) system is analyzed. OFDM under on UWB system has been suggested by the MBOA to gives very high information rate wireless communication. And CSI (Channel state information) can be utilized in the soft-decision procedure to achieve better error correction work. Moreover, to decrease the loss in variety, DCM is suggesting instead of QPSK. DCM is same to 16-QAM, but it utilizes two constellation mapping. Appropriately, it wants two conclusions metric. Therefore DCM has various trust ability about the each mapping constellation. So, this paper suggests the soft conclusion decoding technique utilizing CSI according to each priority for DCM.

4. Medical Image Conversion with DICOM

AUTHOR: Boqiang Liu, Minghui Zhu, Zhenwang Zhang, Cong Yin, Zhongguo Liu, Jason Gu

ABSTRACT: As the standard especially for the storage and communication of medical images, the standard of the Digital Imaging and Communications in Medicine (DICOM) is

famous to the people of the world. And as a conclusion, almost all the results of the Computerized Tomography (CT), magnetic resonance (MR), and digital subtraction angiography (DSA) and Ultrasonography (US) these are saved as a Digital Imaging and Communications in Medicine (DICOM) format. However, the Digital Imaging and Communications in Medicine (DICOM) format files can be opened by the original programs of windows OS, which is not convenient with the further research in image processing. The paper mostly does some research in the conversion from Digital Imaging and Communications in Medicine (DICOM) format files into general image/ media files. The operations is to convert DICOM format files into bitmaps and then convert the bitmaps into other general image/ media files. The images then can be viewed directly by the original programs of windows OS, which will facilitate the further researches on image process. The Digital Imaging and Communications in Medicine (DICOM) format files can be displayed while being transmitted; the images displayed can also be done with some further procedures, such as the methods of lightness and contrast gradient of image, image filtering and categorization.

5. Confidentiality, Integrity and authentication of DICOM medical images

AUTHOR: M. Brindha Department of Computer Science and Engineering, National Institute of Technology, Tiruchirappalli, Tamilnadu, India

ABSTRACT: Due to the security threats during communication of any information, transaction of medical images should be done in a careful manner. This has stimulated the necessity for confidentiality, validation, and integrity of medical images. The confidentiality of header information is achieved from a medical image exchange standard but for the pixel information it is not to achieved. The pixel data achieves validation and integrity but the header information does not. In this paper, a crypto-oriented algorithm is suggesting which offers confidentially, validation, and integrity for the header and pixel information. AES-GCM (Advanced encryption Standard-Galois counter mode) and Whirlpool hash function are utilized for achieving these necessities. Simulations are carried out in a order to show that confidentiality, validation, and integrity have been accomplished by the numerical conclusion of entropy, histogram analysis, and connection.

2. EXISTING SYSTEM:

Content-based image retrieval is known as one of the upcoming procedural structure that will apply various techniques of computer vision for penetrating and organizing the huge image anthology in an effective manner. It is largely accepted that with the growth of immense collection of digital images generated by fast progress in electronically storage ability and computing power, there is a rising requirement for devices and upgraded computer systems for the support of effective and efficient browsing, penetrating, and retrieval for various images from the image collections, be it be online or offline. Therefore, the basic idea of this technique is to develop such type of content-based image retrieval system that can put into operation in a large image gallery desktop application to permit competent browsing with the help of two different exploration methods respectively; retrieval by query based on image and retrieval by text or ticket. In this paper, the MPEG-7 and Edge Directivity Descriptor is used to take out the feature vectors of a particular image from the image database. An effective graphical user interface with the essential utility for the purpose of implementation of different images in the form of image gallery discussed.

3. PROPOSED SYSTEM:

This paper tackles a PC based usual DICOM (Digital Imaging and Communications in Medicine) server for storage of studies obtained at all commercially available echocardiography workstations presently in use at the University Hospitals in the Netherlands.

This storage can be done by a media or network. For transfer across the network the DICOM storage communication protocol is chosen to import DICOM (Digital Imaging and Communications in Medicine) image objects. Via media, DICOM (Digital Imaging and Communications in Medicine) and other formats can be imported. A software module gives for automatic transformation to DICOM (Digital Imaging and Communications in Medicine) part 10 file format. The images are copied to the central repository and the ancillary data's, encoded as DICOM (Digital Imaging and Communications in Medicine) tags, are stored to a relational database. References to the images are also the table items of the same information's. After query and recover via SQL, review with a generic DICOM viewer is available on a routine basis at any PC in the hospital.

4. ALGORITHM DISCRIPTION:

Convolutional neural networks

A typical CNN often consists of various convolutional and fully-joined layers.The exact number of layers generally depends on the requirement of network capacity and memory cost for a specific classification task (e.g., eight layers for AlexNet, and 22 layers for GoogleNet). In particular, let $\mathbf{X} = [\mathbf{x}_1, \ldots, \mathbf{x}_N]$ be the matrix of image training data, where $\mathbf{x}_i$ is the feature vector of the ith image. N is the total number of images. Denote $\mathbf{Y} = [\mathbf{y}_1, \ldots, \mathbf{y}_N]^T \in \{0, 1\}^{N \times K}$, where $\mathbf{y}_i \in \{0, 1\}^{K \times 1}$ is the category indicator vector for $\mathbf{x}_i$. K is the number of categories. Suppose there are M layers in total and $\mathbf{W} = \{\mathbf{W}^{(1)}, \ldots, \mathbf{W}^{(M)}\}$ are the model parameters. In each layer, we absorb the bias type into the weights and indicate them as a whole. $\mathbf{W}^{(m)} = [\mathbf{w}_1^{(m)}, \ldots, \mathbf{w}_{d_m}^{(m)}]^T \in R^{d_m \times d_{m-1}}$, where $\mathbf{w}_i^{(m)} \in R^{d_{m-1}}$, d_{m-1} is the dimension of the $(m-1)$th feature map. $\mathbf{Z}^{(m)}(\mathbf{X}) = [\mathbf{z}^{(m)}(\mathbf{x}_i), \ldots, \mathbf{z}^{(m)}(\mathbf{x}_N)]^T \in R^{N \times d_m}$ indicate the feature map made by the mth layer.

provide an image x i, convolutional layers first task the image as input. The extracted deep representations are denoted as $\mathbf{W} * \mathbf{x}_i$, where * denotes a set of operations of convolution, polling, and activation, and $\mathbf{W}$ denotes the overall parameters for convolutional and pooling operations. The pooling layer in Convolutional neural networks (CNN) is planned to summarize the outputs of neighboring groups of neurons in the same kernel map, which can be conducted by mean-pooling or max-pooling. Some earlier works acquire the neighborhood summarization method by adjacently pooling without overlaps.To produce it more clear, a pooling layer can be considered a pooling layer can be appraise as consisting of a grid of pooling units spaced s pixels apart. Each pooling unit summarizes a neighborhood of size r×rcentered at the location in Convolutional neural networks (CNN). If $s=r$, we can attain the non-overlapping polling. If $s < r$, we can attain overlapping pooling. Extensive studies have shown that the overlapping pooling is difficult to overfit.

Hidden Layers:

Hidden layers can be utilized to learn characteristics as well as classify data, it is not practical to apply to this architecture to images. A very high number of neurons would be required, even in a shallow architecture, due to the very large input sizes connected with images, where each pixel is a relevant variable.

Hidden layer separation code:

```
label=handles.label;
db_lab=strcat(label,'\');
db_labl=strcat('database\',db_lab);
train_db = db_labl;
files = dir([train_db'*.dcm']);
dicomlist = dir(fullfile(train_db,'*.dcm'));
tn=1;
ll=numel(dicomlist);
forcnt = 1 : 16
img{cnt} =
dicomread(fullfile(train_db,dicomlist(cnt).name))
;
```

end
tn=tn-1;

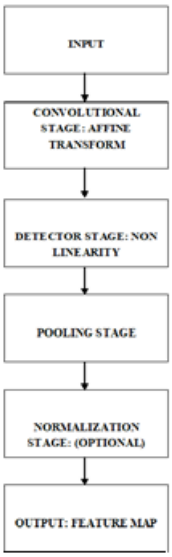

Fig a). Flow Diagram.

5. CONCLUSION:

In this paper, a DL model has been suggested to address the problem of cross-modal retrieval, which is characterized by deep and bidirectional representation learning. In the proposed model, convolutional neural network (CNN) and word-based convolutional neural network (WCNN) are confidently used to learn representations for images and texts, respectively. Subsequently, a bidirectional architecture is designed to fully explore the relations of the matched and unmatched imagetext pairs. The learning objective is to increase the similarities of the matched pairs whereas decreasing the similarities of the unmatched pairs, which is achieved by using the framework of maximum likelihoodThe overall results have shown that the proposed model can successfully learn semantic representations and achieve superior performance on cross-modal retrieval.

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