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Computer-Aided Diagnosis System for Detecting Cancer- A Review

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ABSTRACT

Computer aided diagnosis (CAD) has been a field of research for the past two decades. However, CAD is a very complex subject because it covers many areas of medicine and technology. To develop an overview of CAD research, we reviewed the literature through bibliographic analysis, which we report here. Our study proves that the CAD study was classified and categorized according to the type of disease and the imaging method. This arrangement started from CAM mammography and eventually brain disease. In addition, based on our findings, we discuss future guidelines and CAD research opportunities. First, it offers a data-based approach, as opposed to the typical conceptual approach. Second, standardization and grading of test data sets is required to adopt algorithms and systems. Third, we deliberate the co-development of CAD and imaging research tools such as bone CAD and pancreatic cancer. Fourth, it discusses the possibility of coordinating CAD with clinical decision support systems.

Keywords:-Citation network analysis, Computer-aided diagnosis (CAD),Bibliometric analysis.

I. INTRODUCTION

Significant advances have been made in information technology over the past two decades[1]. This comprises the suggestion of new imaging methods, as future developments in computer-aided analysis of medical images will be analyzed[2]. The breast cancer diagnosis by using mammography was developed in the 1960s by computer-aided analysis, followed by lung cancer and colon cancer[3-4]. With CAD, doctors and especially radiologists can use computer support as a "second opinion" and make a final decision faster and more safely[5-6]. There are two kinds of CAD investigation are the "detection" and "diagnosis" - there are two phases - a "proposal phase" and an "evaluation phase" (Figure 1)[7-8]. In CAD research, "discovery" refers to a technology that is used to reduce observations in general and to mark the area of an image that is subject to certain distortions[9]. The technology for diagnosing aillness using image-based info is called "diagnosis"[10]. Therefore, CAD is an important technology for doctors and medical professionals to reduce the weight and the time required to clarify medical images[11-12]. In addition, CAD systems have improved diagnostic accuracy[13-14], and CAD technology has become an important topic in medical research[15].

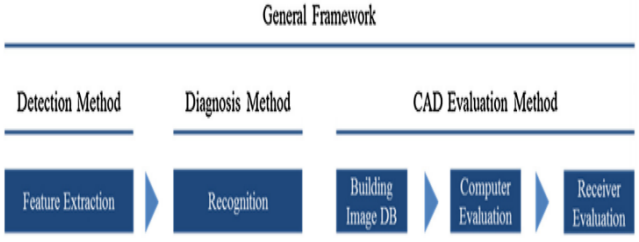

Fig. 1. General CAD framework.

CAD systems can be developed independently in each medical department, for example, B imaging techniques[16]. However, it is very difficult to establish
extensive research trends and “surveys” in CAD[17]. In this object, we provide an overview of the latest CAD developments to support future cross-sectional studies. The expert method and the computational approach[18]. An expert's approach involves distraction, but most of the time they are subjective and allow research to ignore specific topics. On the contrary, the computerized approach provides objective results and provides an accurate overview of the medical condition under consideration[19]. A lot of studies have been done in CAD using expert approaches[20], but the fact that the author did not understand in this study is unlikely to be overlooked[21]. Therefore, in this article, we have used a computer-based approach for objective discussion called biometric analysis[22].

II. OVERVIEW OF CURRENT CAD RESEARCH STATUS AND TREND

After the citation network clusters, CAD studies are divided into clusters based on their direct citation topology[23]. We focused on seven groups with more than a hundred jobs[24]; The figure shows an overview of these clusters. 2. These seven clusters with 7005 securities cover more than 0% network components[25]. After a brief analysis of the clusters, we determined that the documents related to CAD were of pharmacological and imaging method[26]. We examined the history and progress of CAD by reorganizing the cluster according to the average publication year[27]. Cluster number (CAD for brain diseases) is the last and can be considered as a research topic in this field for the last few years[28-30].

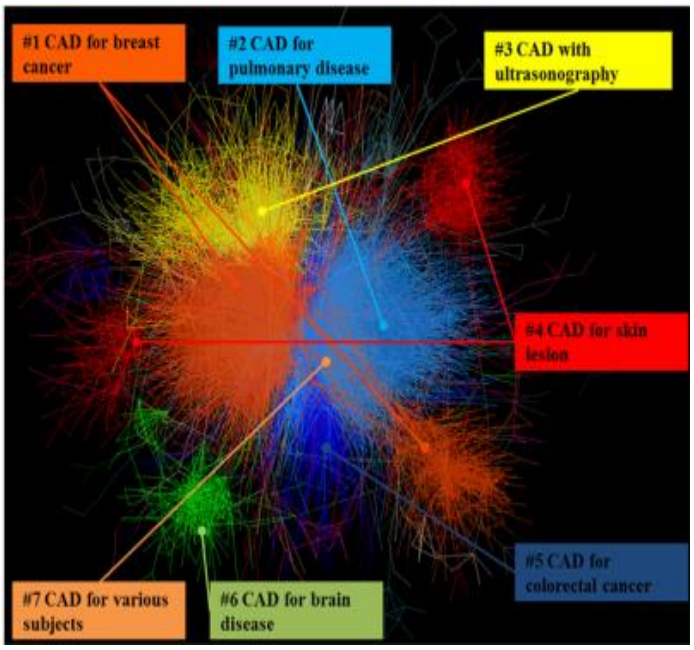

Fig. 2. CAD Academic research overview.

For articles in seven groups showing important scientific work in this field and a good exchange of knowledge in this field[31]. Cluster # 7 (CAD for Teeth and Internal Organs), Cluster # 4 (CAD for Skin Injuries) and Cluster # 6 have relatively few links and can be seen as areas with less advanced knowledge[32] exchange except where research topics are more specific. The number in the cluster is at a great distance from the other clusters, which indicates the interdependence between it and it[33].

After examining the educational environment of CAD research, we selected the four best radio frequency quarterlies in each cluster[34]. The outcomes showed us the specific characteristics of the main journals frequently cited in each cluster (e.g., companies that manufacture photo-optical devices, medical physics, etc.)[35]. For example, there is no cluster. Computer magazines were preferred in 6 (e.g. lecture notes, applications). This may indicate that CAD needsprogressive calculation methods for image processing in brain diseases[36]

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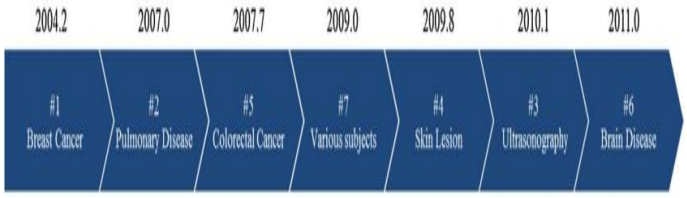

Fig. 3. CAD development history.

Analyze thermodynamics to add figs useful in CAD research areas. All rights reserved[37]. Each cell gradient represents the correlation between the gradient clusters: dark blue represents a higher correlation (0. more than cosine equivalence), light blue represents a lower correlation (less than cosine equivalence), no correlation between these white clusters (cosine equivalent 0)[38]. Clusters # 1 and # 3 are strongly correlated. Surprisingly, the number 1 has been linked to the number 3 because the latter focuses on sonography, the method of which was primarily to diagnose the breast and prostate[39]. Therefore, the word "chest" can be said to be similarity and relevance. Clusters 4, 6, clusters 5, 6 and clusters 1 and 7 have nothing to do[40]. This means that clusters 6, 4 and 5 have modes that are not considered standard or that improvements made to cluster 6 are likely to translate into other clusters' ideas[41]. In addition, we have concluded that no. 6 The CAD cluster is a specific area of research that uses technologies other than CAD to focus on other parts of the body[42].

III. OVERVIEW OF SUB-FIELDS OF CAD RESEARCH

After examining the overall structure of CAD studies, we conducted a survey in each cluster[43]. We selected the 10 most cited files of the year and the 10 most cited files published in 2015 from each cluster except clusters # 3 and # 7 and summarized below[44]. We calculated the basic statistics for each cluster as follows: final author's name, year of publication, journal title, number of references in each cluster, main topic, method keywords and results[45].

Breast Cancer CAD

In this cluster, all work on the diagnosis or diagnosis of breast cancer is concentrated on research[46]. Breast cancer CAD # 1 can be separated into three subject areas: "microclassification", "mass" and "architectural deformity"[47]. Most breast cancer CAD research has reached the diagnostic stage[48]. For this reason, a professional CAD product (image tester of R2 technology) has already been developed, and research in this area continues to develop[49].

Pulmonary Disease CAD

The main topic in this cluster was the detection of pulmonary nodules in pulmonary disease, which was used as a computed tomography method in all publications[50]. 2D and 3D analysis are effective in detecting pulmonary nodules[51]. Unlike # 1, a CAD study of lung disease can be seen in the transition amongexpansion and diagnosis.

Ultrasonography CAD

In this section, treatments related to CHD of the breast and prostate should be based on the main details (the five main periods were breast, lesions, tumors, ultrasound and prostate)[52]. However, all articles about breast cancer. Therefore, we tried to compile aggregates using the same analysis method for the classification method to separate the subgroups[53]. Statistically and in its basic form, the only

basic methods are diagnostic and magnetic resonance imaging as well as breast and prostate cancer. As in Part 1, CAD has become the norm for breast cancer, and CAD for prostate cancer[54].

Skin lesion CAD

In this area, the most common diagnosis of dermoscope was made and the most focused were on the skin[55]. CAD sheets were used for identification and some studies were used for identification.

Colorectal Cancer CAD

The dissociation of colon and CT colonography (CTC) was the focus of this section. Colon cancer has not been used to diagnose CAD, and there are no computer-aided "selected" sample papers. Therefore in a new state of development[56].

Brain disease CAD

In this group, they discussed three categories: single photon emission computed tomography (SPECT), emission tomography (PET) and MR. MR has been the emphasis of recent research[57]. Alzheimer's disease is the most frequently cited topic and machine learning methods, especially supporting vectors, have been preferred for analysis. The need for advanced calculations can lead to its weak connection with other ramps, as shown in Figures 1 and 2[58].

Several subject diseases CAD

In this section we note the use of different methods and a hugesum of case studies. For example, this category includes osteoporosis on the planet, liver disease, kidney and others. Many of the pathways and disease issues can cause poor communication with other parties, as shown in Figure 3[59].

Discussion

We think CAD is more effective in identifying patients with different causes (such as Alzheimer's), especially related to adjuvant decision making. We recommend the key to communicating between all technologies in the AD assessment model: AD is identified by the information provided by the hospital, patient, family counseling, and clinical practice[60]. The first data set can be analyzed on the results of software support, then by CAD system. That is why it is necessary to evaluate all the projects and put them all together. This allows the results to be properly categorized even in the initial TM and is very difficult to achieve at this time. Second, we must consider the full statement. Many medical considerations and connections (e.g. patient welfare, interests, financial status, and effectiveness of people's perspectives) in medical services[61]. Software Support Solutions and CAD should act as a mediator for everyone to think. Third, we must control. For example, when systems are used, requirements must be met to ensure that the quality of the foundation is based on constitutional principles. Therefore, it is necessary to explain the impact of each project, how each component works according to the quality of the system, and why the reasons for decisions are different in each case. It is difficult to integrate CAD with software support decision[62].

IV. CONCLUSION

In this article, we have analyzed a quote network to deliver research-based insight and trends in diagnostic / IT research. We determined that mammograms categorize CAD studies from CAD to CAD for brain disease and classify disease types and imaging methods. This development process is an unparalleled achievement that is not even reflected in the peer review. Provides a summary of each area of study, counting method and performance. In addition, based on the results, we deliberated future guidelines and opportunities for CAD research: the feasibility of data-based approaches, the importance of standardizing data sets and evaluation methods, and joint development perspectives CAD research and image tools. This document can help decision-makers and researchers in radiology and medical imaging by providing a complete picture of CAD investigation.

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