未来会有大发展的新领域——健康信息学（Health Informatics）

（临菲信息技术港公众号图文）

2011 年，中科院生物医学信息与健康工程重点实验室，在通过验收时即更名为"中国科学院健康信息学重点实验室"；

2013 年，原 IEEE Transactionson **Information Technology in Biomedicine** 改名为：IEEEJournal of **Biomedical and Health Informatics** (J-BHI)；

中国科学技术大学的生物医学电子工程实验室，现在叫中国科学技术大学健康信息学实验室。

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生物医学与电子信息技术的结合，升华为健康信息学（Health Informatics，HI）。

领域内涵

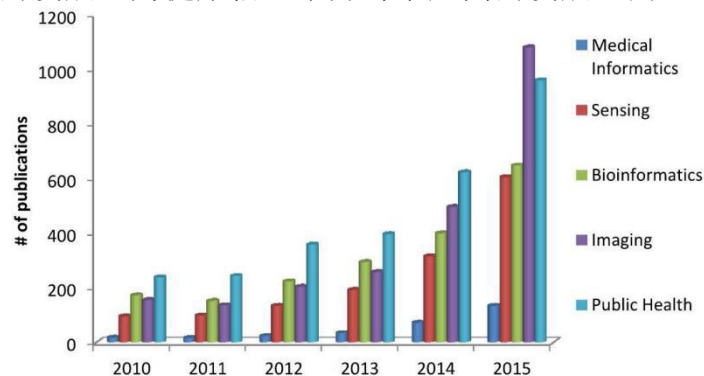健康信息学是信息和通信技术与健康、医疗、生命科学和生物医学的结合，属于信息科学、医学与生命科学的交叉领域。大数据、人工智能、通信和物联网技术的发展，为健康信息学开辟了广阔的发展空间。

Fig. 1. Distribution of published papers that use deep learning in subareas of health informatics. Publication statistics are obtained from Google Scholar; the search phrase is defined as the subfield name with the exact phrase *deep learning* and at least one of *medical* or *health* appearing, e.g., "public health" "deep learning" medical OR health.

深度学习应用于健康信息学子领域（医学信息学、传感、生物信息学、成像、公共卫生）的论文分布

原图来源：Daniele Rav`ı, et al., Deep Learning for Health Informatics, IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS, VOL. 21, NO. 1, JANUARY 2017

EXAMPLES OF STUDIES ILLUSTRATING THE POTENTIAL OF BIG DATA IN HEALTH

Area	Sample	Methods	Data type	Ref
B	2708 subjects	Biostatistics	Gene expression data	[125]
HI (EHR)	2974 patients	Machine Learning (NLP)	Patient records and laboratory results	[126]
HI (EHR)	42 160 control 8549 patients	Statistics	Categorical database of patient records	[127]
B	876* subjects	Genomics	Gene expression data	[128]
S	200* patients	Machine Learning	Wearable sensor and annotation data	[129]
HI	3000 animal sample	Statistics	Veterinary records of health assessment	[130]
HI	745 053 patients	Machine Learning	Preoperative risk data and patient records	[131]
IMG	1414 subjects	Network Analysis	Resting state of neural fMRI data	[132]
IMG EHR	228* patients	Machine Learning	PET scans and patient records	[133]
HI (SN and ENV)	465 million records	Machine Learning	Social network and air quality data	[20]
HI (SN)	686 003 Social network users	Machine Learning (NLP)	Emotions in users' news feeds during 20 years	[134]

Acronyms: B (Bioinformatics), HI (Health Informatics), S (Sensing), IMG. (Imaging), EHR (Electronics Health Records), ENV (Environmental data), SN (Social Network), NLP (Natural Language Processing).
*Although these samples do not make more than 1000 instances, they can be considered large for the particular area of study.

大数据和机器学习应用于健康信息学（HI）的研究实例

图表来源：Javier Andreu-Perez, et al., Big Data for Health,IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS, VOL. 19, NO. 4, JULY 2015
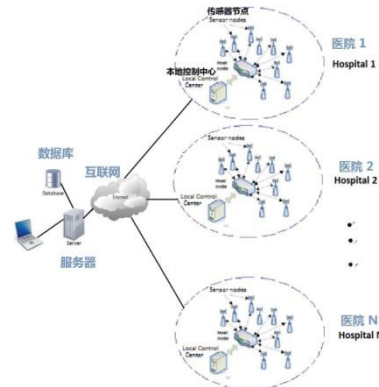
基于物联网的智慧医院

原图来源：Ummer Iqbal , et al., Intelligent Hospitals based on IOT , 4th International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB-18)
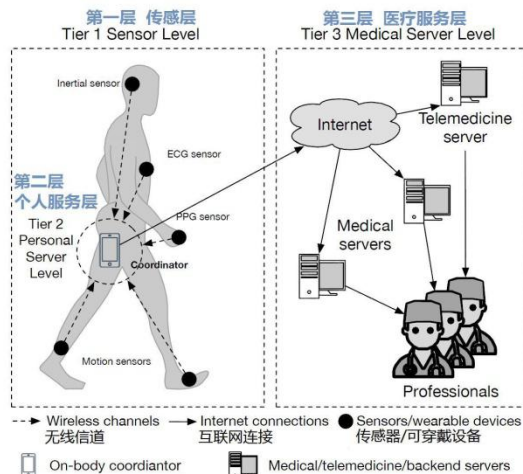

Fig. 1: A typical 3-tier BSN-based healthcare system

基于典型三层躯体传感网（BSN）的保健系统

原图来源：Yingnan Sun,et al., An Artificial Neural Network Framework for Gait Based Biometrics, JBHI.2018.2860780, IEEE Journal of Biomedical and Health Informatics

国外期刊代表

IEEE Journal of Biomedical and HealthInformatics (J-BHI)

Previous Titles: (1997 - 2012) IEEE Transactions on Information Technology in Biomedicine

https://ieeexplore.ieee.org/xpl/aboutJournal.jsp?punumber=6221020
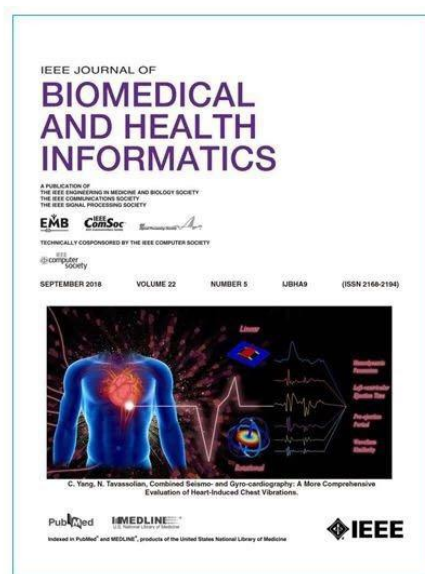
IEEE J-BHI

A Publication of Engineering in Medicine and Biology Society、Communications Society、Signal Processing Society; TechnicallyCosponsored by Computer Society.

J-BHI publishes original papers describing recent advances in the field of biomedical and health informatics where information and communication technologies intersect with health, healthcare, life sciences and biomedicine.

IEEE J-BHI 影响因子

国内实验室代表

中国科学院健康信息学重点实验室

中国科学院深圳先进技术研究院深圳

http://www.siat.cas.cn/ptjs2016/sysypt2016/keylabs/jkxx/201702/t20170220_4748149.html

2007 年 12 月 17 日，中国科学院批准依托深圳先进技术研究院建设中科院生物医学信息与健康工程重点实验室。实验室于 2011 年 4 月 25 日通过中国科学院验收，并更名为"中国科学院健康信息学重点实验室"。

　　实验室的定位和目标："围绕心脑血管疾病早预警、早诊断和健康信息学的主题，重点研究心脑血管健康信息的获取、传输、处理及对疾病干预机制方面的问题，以信息技术为支撑，推动多模、多维、多尺度健康信息获取和成像技术的创新，建设亚洲的世界一流健康信息学实验室，以推动信息科学、生命科学与医学交叉学科的发展，从而促进国家信息化医疗器械与健康产业的快速形成与发展"。

中国科学技术大学健康信息学实验室

http://hi.ustc.edu.cn/index.html

　　中国科学技术大学健康信息学实验室的前身是中国生物医学工程领域著名学者冯焕清教授所创立的生物医学电子工程实验室。

　　实验室致力于生命健康相关的信息科学理论研究和工程应用，内容涵盖信号与智能信息处理、医学图像、生物信息学、数据挖掘与机器学习、先进人机交互等多个方面。

中国科学技术大学健康信息学实验室
原图来源：http://hi.ustc.edu.cn/index.html

附：J-BHI 征文

http://jbhi.embs.org/wp-content/uploads/sites/44/2018/07/Predictive-Intelligence-in-Biomedical-and-Health-Informatics-CFP-JBHI-2018.pdf

IEEE JOURNAL OF

BIOMEDICAL AND HEALTH INFORMATICS

J-BHI Special Issue on **"Predictive Intelligence in Biomedical and Health Informatics"**

Topics of interest include but are not limited to:

- Leveraging health informatics methods for predicting disease development through time from a limited number of observations;

- Computer-aided prognostic methods (e.g., for brain diseases, prostate cancer, cervical cancer, dementia, acute disease, neurodevelopmental disorders);
- Forecasting disease or cancer progression over time;
- Predicting low-dimensional biomedical data (e.g., behavioral scores, clinical outcome, age, gender) from natural, biomedical and/or neuro-images;
- Predicting high-resolution medical images from low-resolution images;
- Biomedical data synthesis: predicting biomedical image modalities from other modalities;
- Predicting lesion evolution;
- Big data analytics for predicting missing data (e.g., data imputation or data completion);
- Predicting clinical outcome from biomedical data (genomic, imaging data, etc.).

Key Dates

Deadline for Submission: 31 January, 2019
First Reviews Due: 30 March, 2019
Revised Manuscript Due: 30 May, 2019
Final Decision: 20 June, 2019

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