Bioinformatika (D18KB030)

2. Informatika Medis

GIBRAN SATYA NUGRAHA

Outline

1. Definisi informatika medis
2. Bidang ilmu yang relevan
3. Sejarah informatika medis
4. Ruang lingkup informatika medis
5. Era digital di bidang klinis
6. Klasifikasi

Definisi informatika medis

Edward H. Shortliffe : ilmu yang menggunakan alat-alat bantu analisis sistem untuk mengembangkan prosedur (algoritma) untuk manajemen, control proses, pembuatan keputusan dan analisis keilmuan dari pengetahuan medis

Bemmel: aspek-aspek teori dan praktek dari pemrosesan informasi dan komunikasi, yang didasarkan pada dan pengalaman yang diturunkan dari proses-proses yang ada pada dunia medis dan perawatan kesehatan

Definisi informatika medis

Clark, 2004

1. Manajemen pengetahuan: jurnal, informasi kesehatan
2. Manajemen informasi: medical record
3. Pendukung keputusan: sistem pakar
4. Komunikasi: email, sms, presentasi

Bidang ilmu yang relevan

1. Ilmu medis
2. Biologi
3. Matematika
4. Sistem informasi
5. Ilmu computer
6. Statistika
7. Ekonomi (kebijakan perawatan kesehatan)
8. Psikologi

Sejarah informatika medis

1940-1960
- Lendley dan Lusted
- Aplikasi computer untuk diagnosis jantung

1970
Dibukanya beberapa departemen khusus informatika medis di Jerman, Polandia, Amerika Serikat

1972
MYCIN

MYCIN
ARTIFICIAL INTELLIGENCE PROGRAM

MYCIN, an early expert system, or artificial intelligence (AI) program, for treating blood infections. In 1972 work began on MYCIN at Stanford University in California. MYCIN would attempt to diagnose patients based on reported symptoms and medical test results. The program could request further information concerning the patient, as well as suggest additional laboratory tests, to arrive at a probable diagnosis, after which it would recommend a course of treatment. If requested, MYCIN would explain the reasoning that led to its diagnosis and recommendation. Using about 500 production rules, MYCIN operated at roughly the same level of competence as human specialists in blood infections and rather better than general practitioners.

Ruang lingkup informatika medis

1. Sistem informasi rumah sakit
2. Sistem pendukung keputusan klinis

Hospital Information System

1. Mampu melakukan integrasi dan komunikasi aliran informasi baik di dalam maupun di luar rumah sakit

2. Meliputi: sistem rekam medic, sistem informasi laboratorium, sistem informasi radiologi (pencitraan medis)

3. Fungsi utama: manajemen dan pengolahan data pasien

Rekam Medis Elektronik

Electronic Medical Record

1. Merekam informasi, mengakses informasi, membantu pengambilan keputusan

2. Menyimpan rekam medis pasien selama seumur hidupnya

3. Memiliki beberapa tipe
   - Data Tekstual: mendeskripsikan gejala dalam bentuk teks. Algoritma parsing sangat dibutuhkan. Standar penulisan yang bersifat formal agar dapat diterjemahkan
   - Grafis: Electrocardiography (ECG), ultrasound (contoh: USG), gambar yang ditulis tangan
   - Digital: hasil sinar X

Tipe data tekstual

USG

ECG

Tipe grafis

Tipe digital
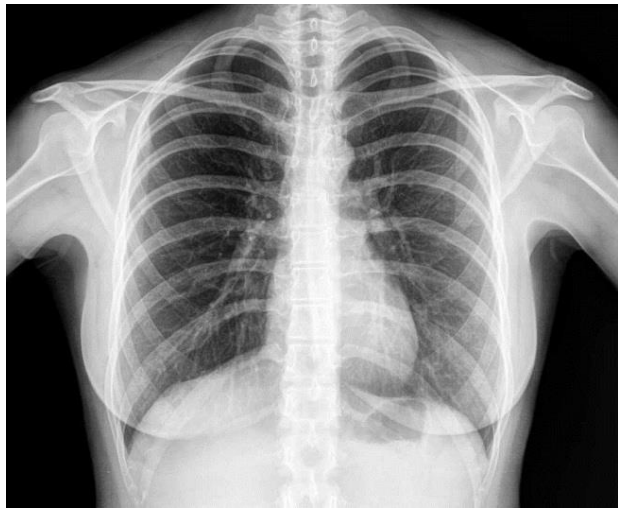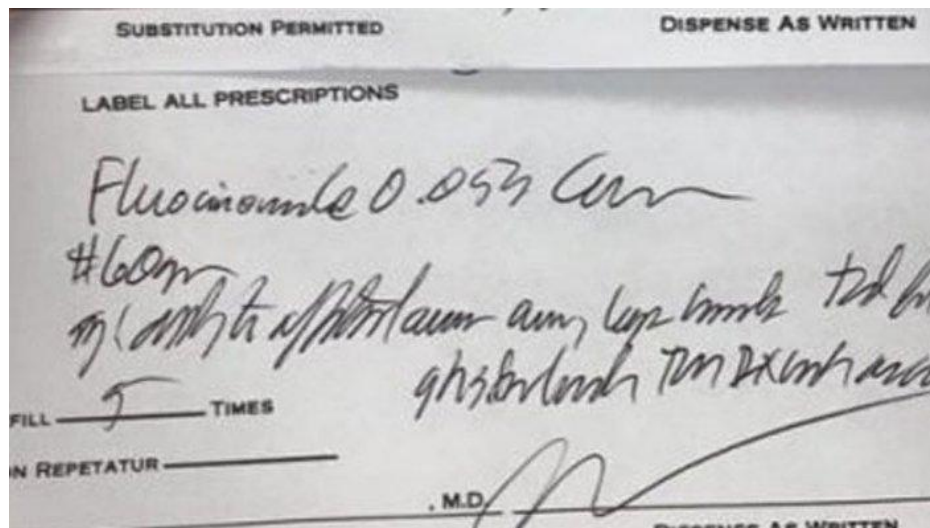
Sistem pendukung keputusan klinis

Clinical Decision Support System

1. Menganalisis data pasien dan membuat keputusan berdasarkan diagnosis, melakukan pencegahan, dan treatment terhadap permasalahan kesehatan

2. Model-model pendukung keputusan ada yang bersifat kuantitatif (statistik) dan juga kualitatif (heuristic)

Siklus diagnosis-terapi
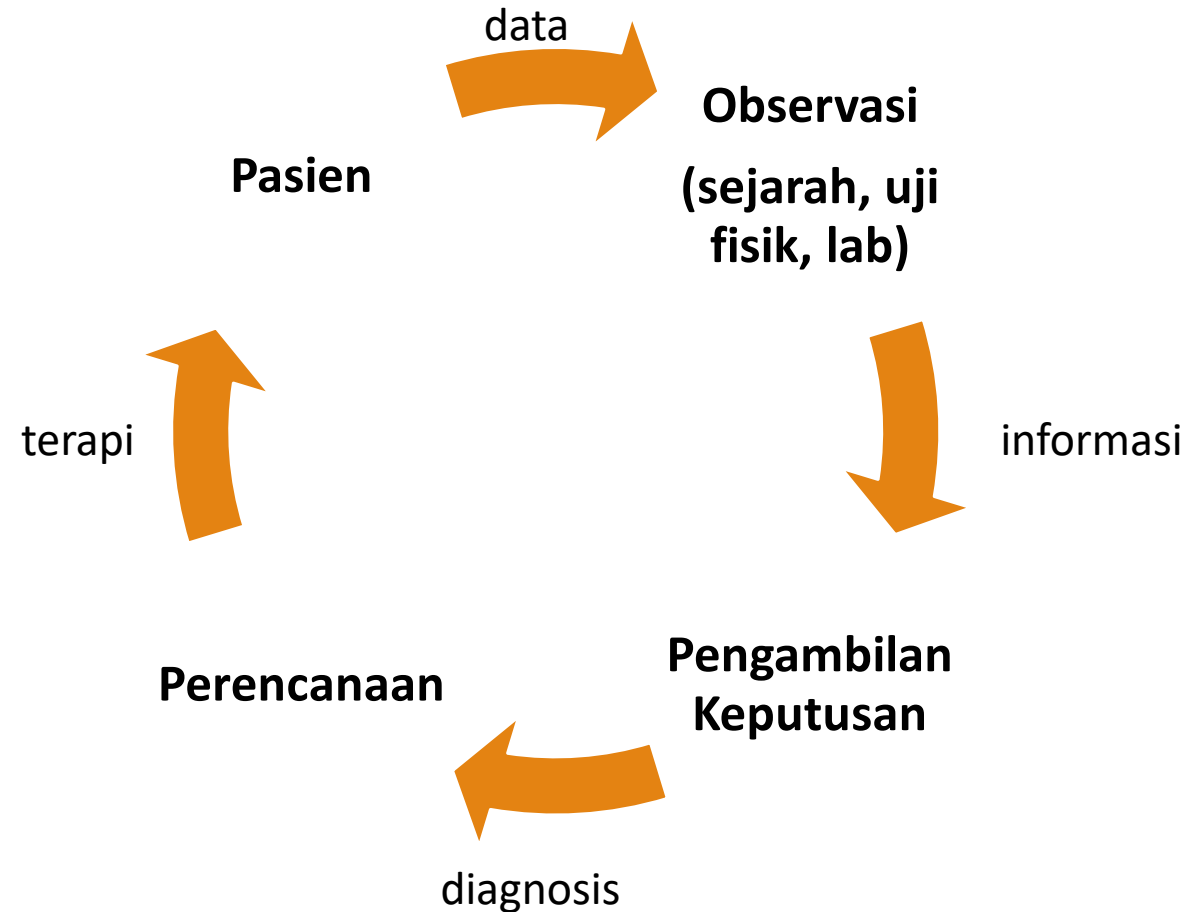
Sistem pendukung keputusan klinis

Dipandang dari tingkat kendalinya, CDSS dapat dibagi menjadi tiga

1. Human-initiated consultation

   Media konsultasi bagi pengguna, contoh MYCIN

2. Data driven reminder

   Pengingat terapi

3. Closed loop system

   Sistem digunakan secara langsung untuk mengetahui kondisi pasien, contoh ventilator

Era digital di bidang klinis

Ultrasonography (USG)

Ultrasonography (USG)

Ultrasonography uses high-frequency sound (ultrasound) waves to produce images of internal organs and other tissues. A device called a transducer converts electrical current into sound waves, which are sent into the body's tissues. Sound waves bounce off structures in the body and are reflected back to the transducer, which converts the waves into electrical signals. A computer converts the pattern of electrical signals into an image, which is displayed on a monitor and recorded as a digital computer image. No x-rays are used, so there is no radiation exposure during an ultrasonography.

Era digital di bidang klinis

Computerized Tomography >< Magnetic Resonance Imagery

CT Scan vs MRI

CT scans and MRI scans are two different ways of creating detailed images of internal body parts. Doctors can then analyze the images to detect abnormalities, such as fractures in bones, tumors on organs, or joint damage.

Some people refer to a CT scan as a CAT scan, which stands for computerized axial tomography. During a CT scan, a person lies down in a large X-ray machine called a CT scanner. The scanner sends images to a computer.

MRI stands for magnetic resonance imagery. This type of scan uses radio waves and magnets to create images. During an MRI scan, a person lies down in an MRI scanner, which is a machine that creates a constant magnetic field and uses radio waves to bounce off water molecules and fat cells in the body. The scanner also sends images to a computer.

CT scans are more common and less expensive than MRIs. However, MRI scans produce a better image than CT scans.

CT   MRI
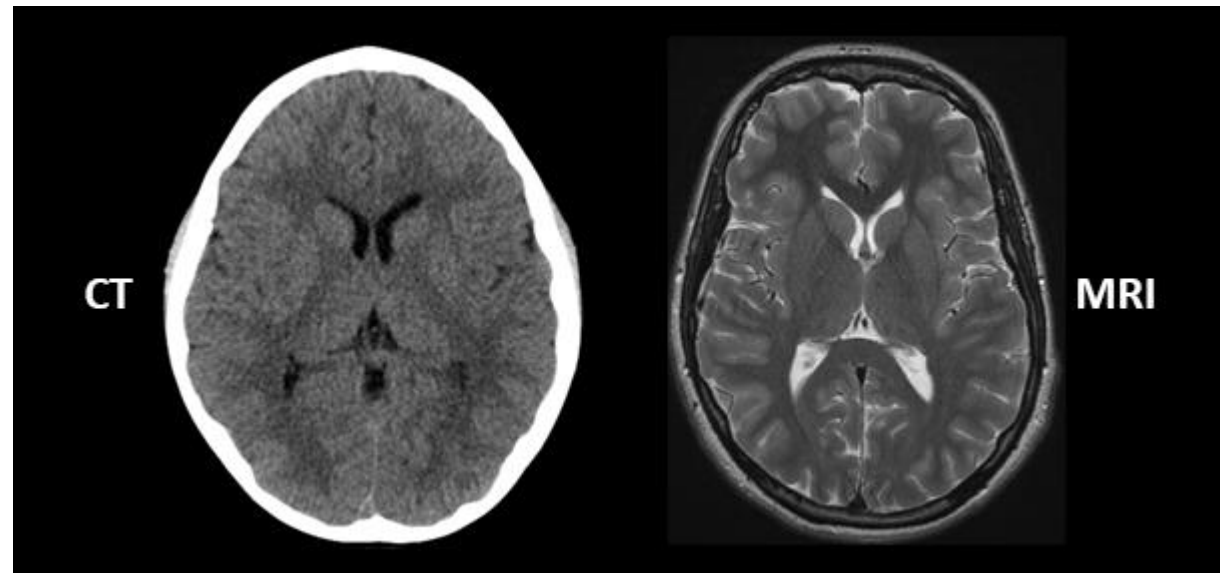
Media komunikasi digital di bidang medis

1. Webblog

2. Konsultasi online (alodokter, kilkdokter, hallodoc)

3. E-commerce (medicastore, alatkesehatan)

Klasifikasi

1. International Classification of Diseases (ICD)

   Pengkodean untuk menggambarkan rekam medic pasien, Dikelola oleh WHO

2. International Classification of Primary Care (ICPC)

   Berisi pengkodean diagnosis, kode penyebab terapi, dan uji laboratorium

3. Diagnostic and Statistical Manual of Mental Disorders (DSM)

   Kode khusus yang dirancang oleh APA (American Psychiatric Association) untuk menangani ganguan mental pada ICD 10. digunakan oleh para psikiatris