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Pengantar Artificial Intelligence **Machine Learning dan Big Data**

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Pengantar Artificial Intelligence

Machine Learning dan Big Data

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Kata Pengantar

Puji dan syukur ke hadirat Tuhan Yang Maha Esa atas segala rahmat dan karunia-Nya sehingga buku Pengantar Artificial Intelligence, Machine Learning, dan Big Data ini dapat disusun dan diselesaikan dengan baik. Buku ini disiapkan sebagai bahan ajar, referensi akademik, dan bacaan komprehensif bagi mahasiswa, dosen, peneliti, serta praktisi yang ingin memahami secara mendasar hingga aplikatif perkembangan teknologi cerdas di era digital.

Perkembangan pesat Artificial Intelligence (AI), Machine Learning (ML), dan Big Data telah membawa perubahan besar dalam berbagai sektor kehidupan, mulai dari pendidikan, kesehatan, industri, pertanian, keuangan, hingga pemerintahan. Teknologi-teknologi ini tidak lagi sekadar menjadi alat pendukung, tetapi telah menjadi fondasi utama dalam pengambilan keputusan, otomatisasi proses, analisis data skala besar, serta pengembangan sistem yang adaptif dan cerdas. Oleh karena itu, pemahaman yang terstruktur, kritis, dan beretika terhadap AI, ML, dan Big Data menjadi kebutuhan yang sangat penting di era transformasi digital.

Buku ini disusun secara sistematis dan bertahap, dimulai dari lanskap teknologi cerdas di era digital, konsep dasar Artificial Intelligence, arsitektur dan komponen sistem AI, hingga pengantar dan jenis-jenis Machine Learning beserta algoritma dasarnya. Selanjutnya, buku ini membahas evaluasi dan validasi model Machine Learning, konsep dan teknologi Big Data, serta integrasinya dalam berbagai bidang industri. Pembahasan juga diperluas ke topik lanjutan seperti Deep Learning, Natural Language Processing (NLP), analisis media sosial berbasis AI, sistem pendukung keputusan berbasis AI, serta isu etika, privasi, dan keamanan. Pada bagian akhir, buku ini mengulas tren dan perkembangan terkini Artificial Intelligence sebagai gambaran arah masa depan teknologi cerdas.

Penyajian materi dalam buku ini dirancang untuk mengintegrasikan aspek konseptual, teknis, dan aplikatif dengan bahasa yang sistematis dan mudah dipahami, tanpa mengabaikan kedalaman akademik. Dengan demikian, buku ini diharapkan dapat membantu pembaca membangun fondasi pengetahuan yang kuat sekaligus wawasan kritis dalam memahami dan memanfaatkan AI, Machine Learning, dan Big Data secara bertanggung jawab.

Akhir kata, semoga buku Pengantar Artificial Intelligence, Machine Learning, dan Big Data ini dapat memberikan manfaat yang luas serta berkontribusi dalam pengembangan ilmu pengetahuan, peningkatan literasi teknologi, dan pemanfaatan teknologi cerdas yang beretika dan berkelanjutan.

Februari 2026
Penulis

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Saat ini adalah dosen tetap Program Studi Sains Data Fakultas Ilmu Komputer dan Teknologi Informasi Universitas Muhammadiyah Sumatera Utara. Mengampu mata kuliah Pengantar Teknologi Informasi, Sistem Operasi, Komunikasi Data dan Jaringan Komputer, Manajemen dan Desain Jaringan Komputer, Teknologi Antar Jaringan. Sebelumnya pernah bekerja di beberapa perusahaan sebagai support and system engineer, dilibatkan dalam proyek komputer dan jaringan di sekolah dan perusahaan.

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studi Teknik Informatika di Universitas Sumatera Utara (USU) tahun 2017. Sebagai tenaga pengajar yang bertugas di Fakultas Ilmu Komputer dan Teknologi Informasi UMSU pada tahun 2020 sampai sekarang. Penulis juga mengasuh mata kuliah Analisis dan Desain Sistem, Mikrokontroler dan Bahasa Assembly, Internet of Thing (IoT) dan Robotik pada program studi Teknologi Informasi. E-mail: mhd.basri@umsu.ac.id



Nur Fadilah. Lahir di Loka, Kabupaten Enrekang, Sulawesi Selatan pada 08 November 1993. Menyelesaikan studi Magister pada Departemen Ilmu Komputer dan Elektronika, FMIPA Universitas Gadjah Mada pada tahun 2022. Sebelumnya menempuh pendidikan Sarjana (S1) pada Jurusan Pendidikan Teknik Elektro, Program Studi Pendidikan Teknik Informatika dan Komputer di Universitas Negeri Makassar melalui jalur SNMPTN dan lulus pada tahun 2016. Memulai karier sebagai dosen di Universitas Megarezky Makassar pada

tahun 2023 dan sejak Juni 2025, menjadi dosen tetap pada Jurusan Matematika, Universitas Negeri Makassar.

Fokus keilmuan utama berada pada bidang Natural Language Processing (NLP), dengan minat penelitian pada pemodelan bahasa, analisis teks, kecerdasan buatan, serta integrasi metode komputasi dan matematika dalam pengolahan bahasa alami. Aktif dalam kegiatan pengajaran, penelitian, dan pengabdian kepada masyarakat, serta membimbing mahasiswa dalam pengembangan proyek akademik dan karya ilmiah di bidang matematika komputasi dan kecerdasan buatan.

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Nurul Maulidiyah, biasa dipanggil Nurul, lulusan dari Master of International Institute of Medical Device Innovation, Biomedical Engineering, National Cheng Kung University, Taiwan pada tahun 2021. Ia menempuh studi Sarjana Fisika di Institut Teknologi Sepuluh Nopember Surabaya pada tahun 2018, dengan bidang penelitian Fisika Medis. Pada saat studi Master, ia bergabung di Laboratory of Wearable Technology and Medical Healthcare. Ia adalah dosen tetap Program Studi Teknik Biomedis,

Fakultas Teknologi Industri, Institut Teknologi Sumatera sejak 2025 dengan kelompok keahlian Instrumentasi dan Pengolahan Citra Medis

Sebelum menjadi dosen, ia menjadi guru Fisika di SMA International Islamic Boarding School Ar Rohmah Malang. Selain menjadi guru, ia juga membina

study club fisika untuk persiapan olimpiade, koordinator foreign language society bidang bahasa Mandarin, dan juga pembimbing program project dan research siswa.

Selain dalam dunia pendidikan, beliau juga tergabung dalam Aliansi Fisikawan Medik Indonesia.

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David JM Sembiring, dilahirkan di Medan pada bulan September 1969. Menyelesaikan pendidikan S1-Teknik Informatika pada tahun 2002 di STMIK SM Raja XII Medan, S2-Teknik Informatika pada tahun 2004 di Universitas Gajah Mada, menyelesaikan Pendidikan S3-Ilmu Komputer pada tahun 2023 di Fakultas Ilmu Komputer dan Teknologi Informasi Universitas Sumatera Utara.

Ia sekarang menjadi Rektor di Institut Teknologi dan Bisnis Indonesia, Deli Serdang.

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Gelard Untirtha Pratama. Telah Menyelesaikan Studi Program Magister Ilmu Komputer, FMIPA Institut Pertanian Bogor pada program studi Ilmu Komputer dengan Judul Tesis tentang Model Pohon Keputusan untuk penentuan kelayakan penerima bantuan pemerintah Non-Tunai. Sebelumnya mengikuti Pendidikan Program S1 di universitas serang raya dengan program studi Teknik Informatika . Ia adalah dosen tetap Program Studi Rekayasa Instrumentasi dan Automasi, Fakultas Teknologi Industri, Institut Teknologi Sumatera.

Selain aktivitas profesional, ia turut berkontribusi dalam kegiatan akademik melalui penulisan artikel, pengembangan materi pembelajaran, dan pendampingan proyek berbasis data. Ketertarikannya tidak hanya pada aspek teknis, tetapi juga pada isu etika, privasi, dan keamanan dalam

pemanfaatan teknologi data. Melalui buku ini, penulis berharap dapat memberikan pemahaman yang sistematis dan aplikatif mengenai teknologi Big Data bagi mahasiswa, akademisi, maupun praktisi industri.

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Nazuwatussyah'diyah. Telah Menyelesaikan Studi Program Magister Instrumentasi dan Kontrol, Fakultas Teknologi Industri ITB dengan topik tesis tentang Perancangan Sistem Kontrol Adaptif Proses Netralisasi pH pada Instalasi Pengolahan Air Limbah Industri Batik. Sebelumnya mengikuti Pendidikan Program S1 Teknik Fisika di ITB. Ia adalah dosen tetap Program Studi Rekayasa Instrumentasi dan Automasi, Fakultas Teknologi Industri, Institut Teknologi Sumatera.

Mengampu mata kuliah Pengantar Komputer dan Software, Dasar Teknologi Digital, Matematika Dasar, Rangkaian Listrik, Dinamika Sistem, Sinyal dan Sistem Kendali, Pengolahan Sinyal Digital, Sistem Kontrol Dasar, Sistem Kontrol Lanjut, Pemrograman Web dan IoT Instrumentasi, Elektronika Industri, Proyek Perancangan Terintegrasi II, Instrumentasi NDT dan Inspeksi, serta Sistem Energi. Selama ini terlibat aktif sebagai dosen pembimbing kerja praktik maupun tugas akhir mahasiswa, serta Program Kreativitas Mahasiswa, sekaligus terlibat dalam pengembangan riset Automated Guided Vehicle (AGV) dan Sistem Otomatisasi Penyortiran Biji Kopi.

Telah menulis buku referensi "Internet of Things (IoT): Konsep dan Aplikasi", Penerbit Kita Menulis, dan buku referensi "Pengetahuan Dasar Desain PCB pada Aplikasi KiCad", Penerbit ITERA Press.

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Ronal, seorang profesional di bidang otomasi, kecerdasan buatan (AI), dan rekayasa perangkat lunak dengan pengalaman luas dalam pengembangan sistem di berbagai industri, termasuk perbankan. Keahlian saya mencakup IoT, machine learning, serta sistem otomasi, dengan fokus pada pengembangan dan pemeliharaan sistem berbasis web dan desktop, manajemen database SQL Server dan Oracle, serta integrasi dengan sistem yang telah berjalan. Saya juga berpengalaman dalam migrasi data, pengembangan

fitur keamanan, serta optimalisasi sistem transaksi dan pelaporan untuk meningkatkan efisiensi dan keandalan sistem. Selain itu, saya terbiasa bekerja dalam tim lintas disiplin untuk mengembangkan solusi berbasis teknologi yang inovatif, scalable, dan sesuai dengan kebutuhan industri modern.

Selain itu, saya memiliki keahlian dalam pemrograman sistem otomatisasi berbasis PC dan PLC, serta penerapan AI dan Machine Learning untuk meningkatkan efisiensi dan kinerja sistem. Pengalaman saya dalam reverse engineering perangkat lunak dan firmware memungkinkan saya mengidentifikasi, mengoptimalkan, dan meningkatkan performa sistem yang sudah ada. Dengan perpaduan keahlian teknis dan pengalaman praktis, saya berkomitmen untuk menghadirkan solusi inovatif yang dapat mendukung transformasi digital dan meningkatkan daya saing industri.

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Rizki Yustisia Sari. Telah Menyelesaikan Studi Program Magister Teknologi Informasi, Fasilkom Universitas Indonesia dengan topik karya akhir tentang Techonolgy Acceptance Model.

Sebelum berkiprah sebagai akademisi, memiliki pengalaman profesional yang signifikan di sektor pemerintahan. Ia pernah bertugas sebagai Tenaga Ahli Sistem Basis Data dan Tenaga Ahli Sistem Informasi di Biro Perencanaan Anggaran dan Kerjasama Luar Negeri, Kementerian Pekerjaan Umum dan Perumahan Rakyat (PUPR) Republik Indonesia.

Saat ini, minat riset dan pengajaran mencakup bidang teknologi informasi, sistem informasi, kecerdasan buatan, serta analisis data.

Mengampu mata kuliah matematika dasar IA dan IIA, Pengantar Komputer dan Software I dan II, Dasar Teknologi Digital, Pengenalan Komputasi, Pembelajaran Mesin dan Kecerdasan Buatan, Dinamika Sistem, Kecerdasan Buatan, Data Science dan Analitik, Pengantar Instrumentasi dan Automasi, Sistem Linier, Matematika Diskrit, Pemrograman Berbasis Objek, Aljabar Linier, Statistika dan Sains Data, Etika Profesi dan Kerja Praktik, dan Pemrograman Web Berbasis IoT.

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Riah Ukur Ginting. Telah Menyelesaikan Studi Program Doktor Ilmu Komputer, Fakultas Ilmu Komputer dan Teknologi Informasi USU dengan topik disertasi tentang Model Transmisi Dinamis Dari Covid-19 Dengan Adanya Isolasi Menggunakan Pendekatan Deep Learning. Sebelumnya mengikuti Pendidikan Program S1 Program Studi Matematika bidang Ilmu Komputer dari FMIPA USU dan S2 Program Studi Ilmu Komputer dari FMIPA UGM Yogyakarta. Ia adalah dosen tetap Program Studi Sistem Informasi, Fakultas Sains dan Teknologi Informasi Universitas Sari Mutiara Indonesia.

Mengampu mata kuliah Sistem Pendukung Keputusan, Sistem Pakar, Kecerdasan Buatan, Data Mining, Internet of Things dan Kerja Praktek. Selama ini terlibat aktif sebagai dosen pembimbing magang mahasiswa Rekayasa Kecerdasan Buatan dan pembimbing skripsi mahasiswa.

Selama ini terlibat aktif dalam APTIKOM Sumut dan IndoCEISS Sumut.

Telah menulis 1 Buku dengan judul Sistem Evaluasi Kepuasan Mahasiswa menggunakan Metode Fuzzy, Penerbit Zifatama Jawaara tahun 2019 dan 1 buku hasil penelitian yang berjudul Deteksi Dini Kanker Otak menggunakan Ridge Polynomial Neural Network di RSUP H.Adam Malik Medan Berbasis Revolusi Industri 4.0 Penerbit Polmed Press tahun 2022. E-mail: riahukur@gmail.com, riahukur@sari-mutiara.ac.id.



Mardhiyatna merupakan seorang akademisi yang saat ini berprofesi sebagai dosen di Program Studi Rekayasa Instrumentasi dan Automasi, Fakultas Teknologi Industri, Institut Teknologi Sumatera. Ia menyelesaikan pendidikan sarjana di bidang Fisika dan melanjutkan studi magister di bidang Fisika Instrumentasi.

Dalam kegiatan pendidikan dan pengajaran, ia mengampu mata kuliah Pengantar Komputer dan Software, Dasar Teknologi Digital, Pengenalan Komputasi, Matematika Dasar, Matematika Diskrit, Pengolahan Sinyal Digital, serta Hyperspectral Imaging. Selain itu, ia juga terlibat dalam kegiatan penelitian di bidang pengolahan citra.

Telah menulis satu buku referensi berjudul Internet of Things (IoT): Konsep dan Aplikasi yang diterbitkan oleh Penerbit Kita Menulis.

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Ahyuna, S.Kom., M.I.Kom Lahir di Pare-pare, 14 November 1985. Saat ini penulis menjadi dosen tetap program studi Teknik Informatika di Universitas Dipa Makassar sejak tahun 2009. Pendidikan terakhir penulis S2 Ilmu Komunikasi dan kini kesibukan penulis adalah lebih menghabiskan waktu untuk mengajar dan menulis. Karya-karya yang telah dibuat kini telah dimuat di media online, jurnal nasional, jurnal internasional, dan jurnal nasional bereputasi. Penulis juga aktif dalam pembuatan dan kegiatan prosiding, penelitian dan pengabdian Masyarakat. Jurnal ditulis bekerjasama dengan para pakar diluar

negara dan dalam negara. Anak ke tiga dari tiga bersaudara sering melakukan penelitian kecil dan dijadikan pelaporan aktifitas dalam kampus dan pribadi. Berkat hobi menulis dan membaca maka kadang penulis sering diajak berkolaborasi dalam kegiatan menuliskan jurnal, kegiatan akademik dan kegiatan lainnya. Manfaat dari kegiatan yang dilakukan dapat menambah rasa semangat saat penulisan terbit dan memotivasi diri sendiri untuk selalu melakukan lebih dan tidak pernah puas dalam kegiatan riset bidang Teknik.

Pengantar Artificial Intelligence **Machine Learning dan Big Data**

Perkembangan pesat Artificial Intelligence (AI), Machine Learning (ML), dan Big Data telah membawa perubahan besar dalam berbagai sektor kehidupan, mulai dari pendidikan, kesehatan, industri, pertanian, keuangan, hingga pemerintahan. Teknologi-teknologi ini tidak lagi sekadar menjadi alat pendukung, tetapi telah menjadi fondasi utama dalam pengambilan keputusan, otomatisasi proses, analisis data skala besar, serta pengembangan sistem yang adaptif dan cerdas. Oleh karena itu, pemahaman yang terstruktur, kritis, dan beretika terhadap AI, ML, dan Big Data menjadi kebutuhan yang sangat penting di era transformasi digital.

Buku ini membahas:

- Bab 1 Lanskap Teknologi Cerdas di Era Digital
- Bab 2 Konsep Dasar Artificial Intelligence
- Bab 3 Arsitektur Dan Komponen Sistem Artificial Intelligence
- Bab 4 Pengantar Machine Learning
- Bab 5 Jenis – jenis Machine Learning
- Bab 6 Algoritma Dasar Machine Learning
- Bab 7 Evaluasi dan Validasi Model Machine Learning
- Bab 8 Konsep Dasar Big Data
- Bab 9 Teknologi Big Data
- Bab 10 Deep Learning
- Bab 11 Pengantar NLP
- Bab 12 Artificial Intelligence dan Analisis Media Sosial
- Bab 13 Artificial Intelligence Untuk Sistem Pendukung Keputusan
- Bab 14 Etika, Privasi, dan Keamanan Artificial Intelligence
- Bab 15 Tren dan Perkembangan Terkini Artificial Intelligence



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