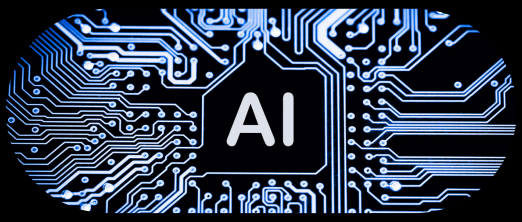
AI ENGINEERING SKILLS CHECKLIST



TECHNICAL FOUNDATION

- ◯ Basic statistics and probability
- ◯ Basic linear algebra
- ◯ Basic calculus
- ◯ Understanding of numerical precision formats
- ◯ Data structures and algorithms fundamentals

SOFTWARE ENGINEERING

- ◯ Python programming
- ◯ Linux & command-line tools
- ◯ Git and version control
- ◯ API design and integration
- ◯ Basic understanding of Docker and containers
- ◯ Cloud platforms
- ◯ System architecture concepts
- ◯ Monitoring and logging
- ◯ Testing

ML BASICS

- ◯ Understanding of supervised/unsupervised learning
- ◯ Common algorithms at a high level
- ◯ Model evaluation metrics
- ◯ Training/validation/test splits
- ◯ Overfitting and underfitting
- ◯ Strong deep learning knowledge

FOUNDATION MODELS & MODEL SELECTION

- ◯ Transformer architecture
- ◯ Attention mechanism
- ◯ Tokenization
- ◯ Model scaling laws (e.g. Chinchilla)
- ◯ Post-training techniques: SFT, RLHF, DPO
- ◯ Tradeoffs: cost vs performance vs licensing
- ◯ Open-weight vs open-source vs API models
- ◯ Tooling for model benchmarking

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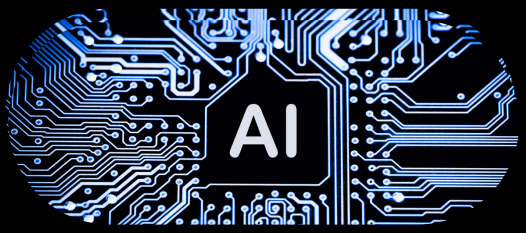

EVALUATION AND TESTING

- ◯ Model evaluation pipelines
- ◯ Evaluation metrics: perplexity, BLEU, ROUGE, semantic similarity, functional correctness, etc.
- ◯ Using AI judges and human evals
- ◯ Measuring hallucinations, toxicity, bias

PROMPT ENGINEERING

- ◯ Structuring effective prompts
- ◯ In-context learning techniques
- ◯ Defensive prompt engineering
- ◯ against attacks
  Prompt experimentation and tracking

RETRIEVAL-AUGMENTED GENERATION (RAG)

- ◯ Vector database implementation
- ◯ Document chunking strategies
- ◯ Embedding techniques
- ◯ Term-based vs. embedding-based retrieval
- ◯ Retrieval optimization techniques

AGENT SYSTEMS

- ◯ Tool integration
- ◯ Planning techniques
- ◯ Memory systems implementation
- ◯ Agent security and safety guardrails
- ◯ Agent evaluation methodologies

FINETUNING

- ◯ Parameter-efficient fine-tuning
- ◯ (PEFT)
- ◯ LoRA and similar approaches
- ◯ Model distillation
- ◯ Model merging
- ◯ Multi-task fine-tuning

DATASET ENGINEERING

- ◯ Data acquisition strategies
- ◯ Data quality assessment
- ◯ Data processing
- ◯ Annotation guidelines creation
- ◯ Data augmentation and synthesis

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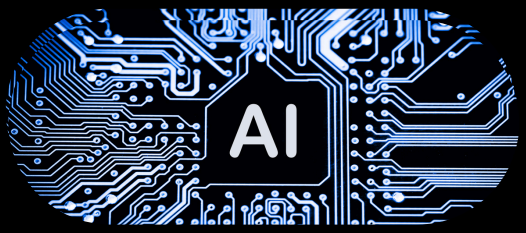

INFERENCE OPTIMIZATION

- ◯ Understanding compute vs memory-bound inference
- ◯ Latency metrics: TTFT, TPOT
- ◯ Model compression: quantization, pruning, distillation
- ◯ Batch vs. online inference strategies
- ◯ Hardware (GPU, TPU, memory specs)
- ◯ Batching techniques
- ◯ Parallel inference strategies
- ◯ Caching implementations

APPLICATION ARCHITECTURE

- ◯ Context construction patterns
- ◯ Input/output guardrails
- ◯ Model routing and gateways
- ◯ Caching architectures
- ◯ Orchestration patterns

SECURITY/PRIVACY/ETHICS

- ◯ Prompt injection detection/mitigation
- ◯ Adversarial input handling
- ◯ PII detection and redaction
- ◯ Secure sandboxing (for agents/code execution)
- ◯ Model privacy risks (e.g. memorization attacks, data leakage)
- ◯ Legal compliance (GDPR, copyright implications)
- ◯ AI Ethics considerations

USER FEEDBACK INTEGRATION

- ◯ Feedback system design
- ◯ Explicit vs. implicit feedback collection
- ◯ Data “flywheels”
- ◯ Human-in-the-loop approaches
- ◯ Continuous improvement cycles