

# Rebalancing Our AI Portfolio

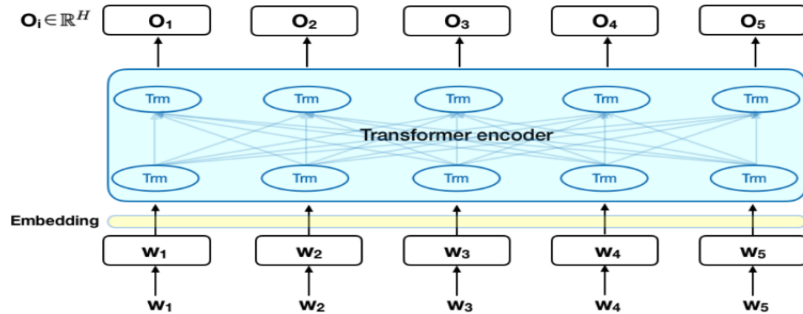
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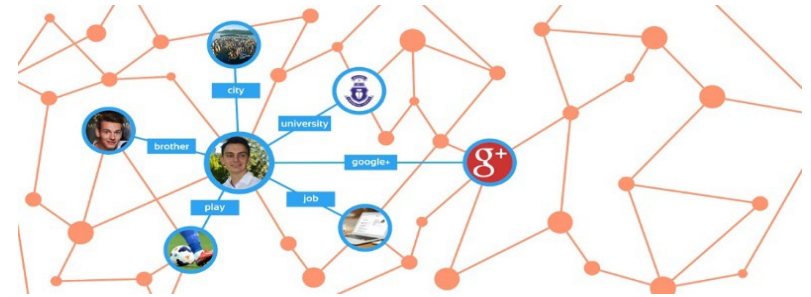
# Three Current Revolutions in AI

## Deep Learning



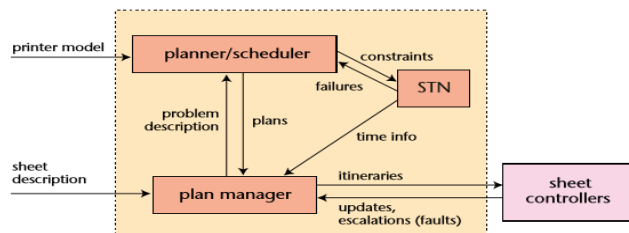
- With massive data, can do classification and other tasks in low-risk settings
- Uses: Speech recognition, facial recognition, etc.

## Knowledge Graphs



- Massive ( $10^6$ - $10^{10}$  fact) symbolic relational representations used by Google, Microsoft, Facebook, Spotify, etc.
- Uses: Higher-precision web search, web-scale question answering, better recommendations

## Reasoning



- Finds solutions to large problems, finds flaws in engineered systems, real-time control, diagnosis, and workarounds
- Daily uses: Logistics, designing and testing complex software (e.g. static analysis of Facebook's  $10^8$  loc software base)

**Each revolution is:**

**Built on 4+ decades of AI research**

**Fueled by massive increases in computational power and available data over the last two decades**



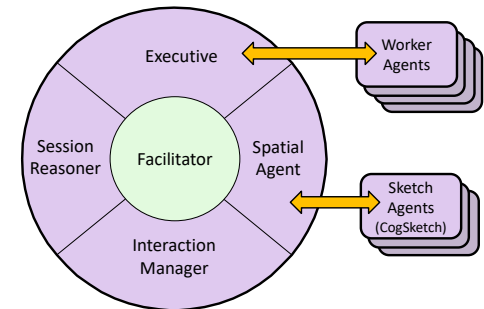
# Integrated Intelligence: The Coming 4th Revolution

## Cognitive architectures

- Examples: SOAR, ACT-R, Companions
- Combine perception, reasoning, learning, action
- Incremental, data-efficient learning of inspectable models
  - For adaptability, verification, and trust
  - e.g. analogy, interactive task learning, inductive logic programming
- Manage their own learning over time
  - Unlike the thousands of engineers used to maintain today's assistants

## Payoffs

- Software collaborators for your work
- Lifelong personal assistants for your life



# Rebalancing Our AI Portfolio

## AI ≠ Generative AI

- Large language/multimodal models have their uses
- But more likely to be components of cognitive architectures than a basis for architectures themselves

## Invest in Open Knowledge Network for commonsense

- Complement to current application-focused efforts
- Maximize expressivity (e.g. modals, higher-order reasoning)

## Invest in more human-like reasoning and learning methods

- Trained with human-sized experiences
- Scalable to human-sized conceptual systems
- Incremental learning of inspectable models for trust, debugging

