XTM International

De-demonizing AI

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LANGUAGE ASLING TECHNOLOGY

Translating and the Computer 41

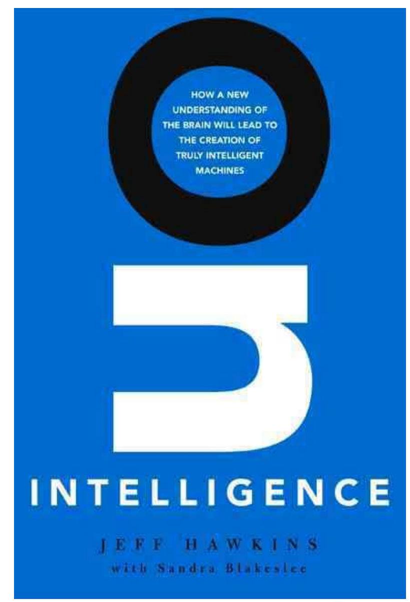
London, 21-22 November 2019

Better Translation Technology

What is intelligence?

1. Recognize patterns
2. Remember those patterns
3. Use the recognized patterns to predict future events

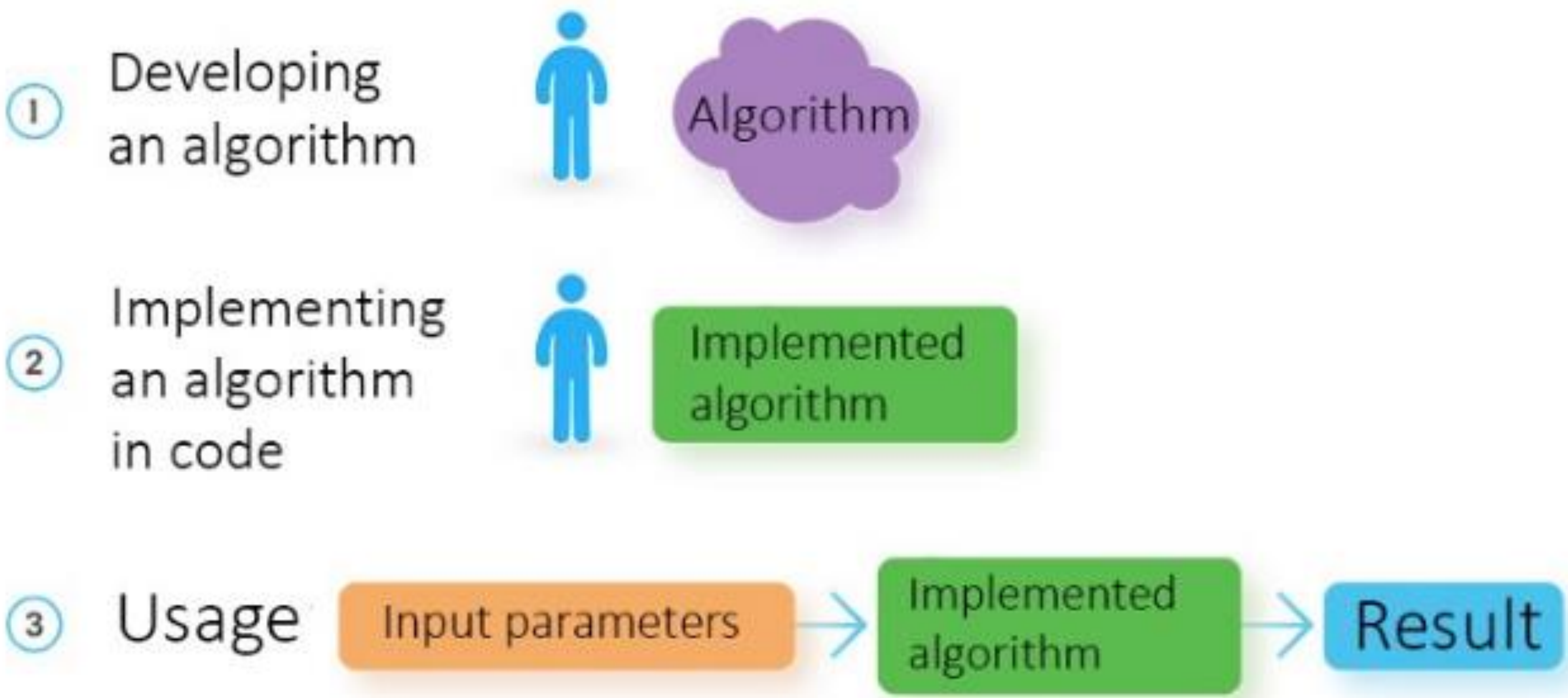
Jeff Hawkins, and Sandra Blakeslee, On Intelligence 2005



What is Artificial Intelligence?

1. Expert Systems
   a. Rule based
   b. Knowledge based
   c. Basic Pattern matching
2. Machine Learning
   a. Bayesian probability
   b. Statistical probability
   c. Neural Networks

Expert Systems: rule based



Expert Systems: rule based

Table 1-1

Run No.	Composition (wt %)														Tensile Extension At a Temperature	Existance of Cracks	Corrosion Rate (mm/year))	
	Cr	Mo	W	Cu	Ca	Zr	Nb	Ta	Hf	Y	Rare Earth Elements	Impurities		Ni and the other impurities			Mixed Acid	Inverse Aqua Regia
												C	N					
1	38.6	0.96	-	-	-	-	-	-	-	-	-	0.045	0.004	rem.	65.5	◎	0.106	0.050
2	43.0	-	1.83	-	-	-	-	-	-	-	-	0.028	0.003	rem.	60.3	◎	0.088	0.049
3	44.2	0.97	0.27	-	-	-	-	-	-	-	-	0.014	0.021	rem.	62.6	◎	0.074	0.046
4	40.5	0.68	-	-	-	-	-	-	-	-	-	0.029	0.004	rem.	61.6	◎	0.098	0.040
5	45.5	0.12	-	-	-	-	-	-	-	-	-	0.022	0.006	rem.	58.5	◎	0.071	0.052
6	42.1	0.96	-	-	-	-	-	-	-	-	-	0.018	0.003	rem.	50.3	◎	0.087	0.053
7	44.6	1.52	-	-	-	-	-	-	-	-	-	0.031	0.003	rem.	55.6	◎	0.078	0.035
8	45.6	-	0.11	-	-	-	-	-	-	-	-	0.032	0.004	rem.	59.2	◎	0.075	0.054
9	44.6	-	0.96	-	-	-	-	-	-	-	-	0.037	0.004	rem.	66.1	◎	0.078	0.042
10	46.5	1.21	-	-	-	-	-	-	-	-	-	0.029	0.006	rem.	60.4	◎	0.077	0.049
11	44.2	0.97	0.27	1.0	-	-	-	-	-	-	-	0.014	0.021	rem.	62.0	◎	0.074	0.030
12	44.6	1.52	-	1.5	-	-	-	-	-	-	-	0.031	0.003	rem.	52.3	◎	0.058	0.020
13	44.6	-	0.96	0.5	-	-	-	-	-	-	-	0.037	0.004	rem.	53.4	◎	0.068	0.037
14	44.2	0.97	0.27	-	0.002	-	-	-	-	-	-	0.014	0.004	rem.	63.6	◎	0.072	0.048
15	44.6	1.52	-	-	0.005	-	-	-	-	-	-	0.031	0.003	rem.	52.7	◎	0.075	0.038
16	44.6	-	0.96	-	0.008	-	-	-	-	-	-	0.014	0.004	rem.	69.3	◎	0.081	0.041
17	44.2	0.97	0.27	-	-	3.0	-	-	-	-	-	0.014	0.004	rem.	64.7	◎	0.083	0.051
18	44.6	1.52	-	-	-	-	0.5	-	-	-	-	0.031	0.003	rem.	57.8	◎	0.063	0.021
19	44.6	-	0.96	-	-	-	-	0.8	-	-	-	0.014	0.004	rem.	69.3	◎	0.060	0.027
20	45.6	-	0.11	-	-	-	-	-	1.2	-	-	0.032	0.004	rem.	63.2	◎	0.075	0.041

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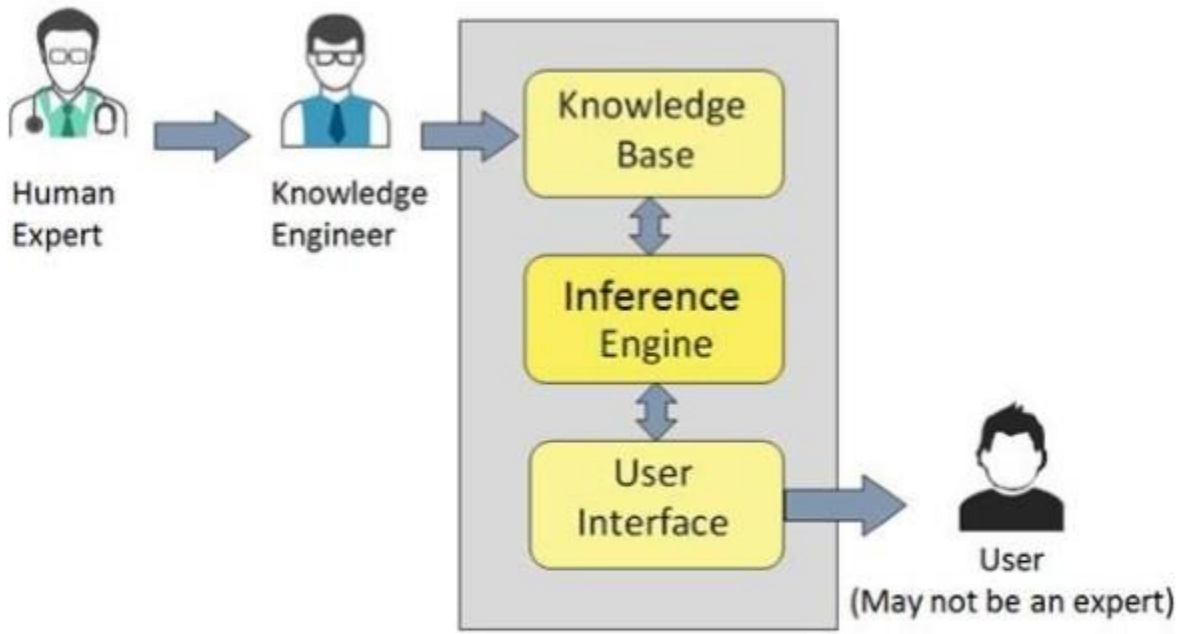
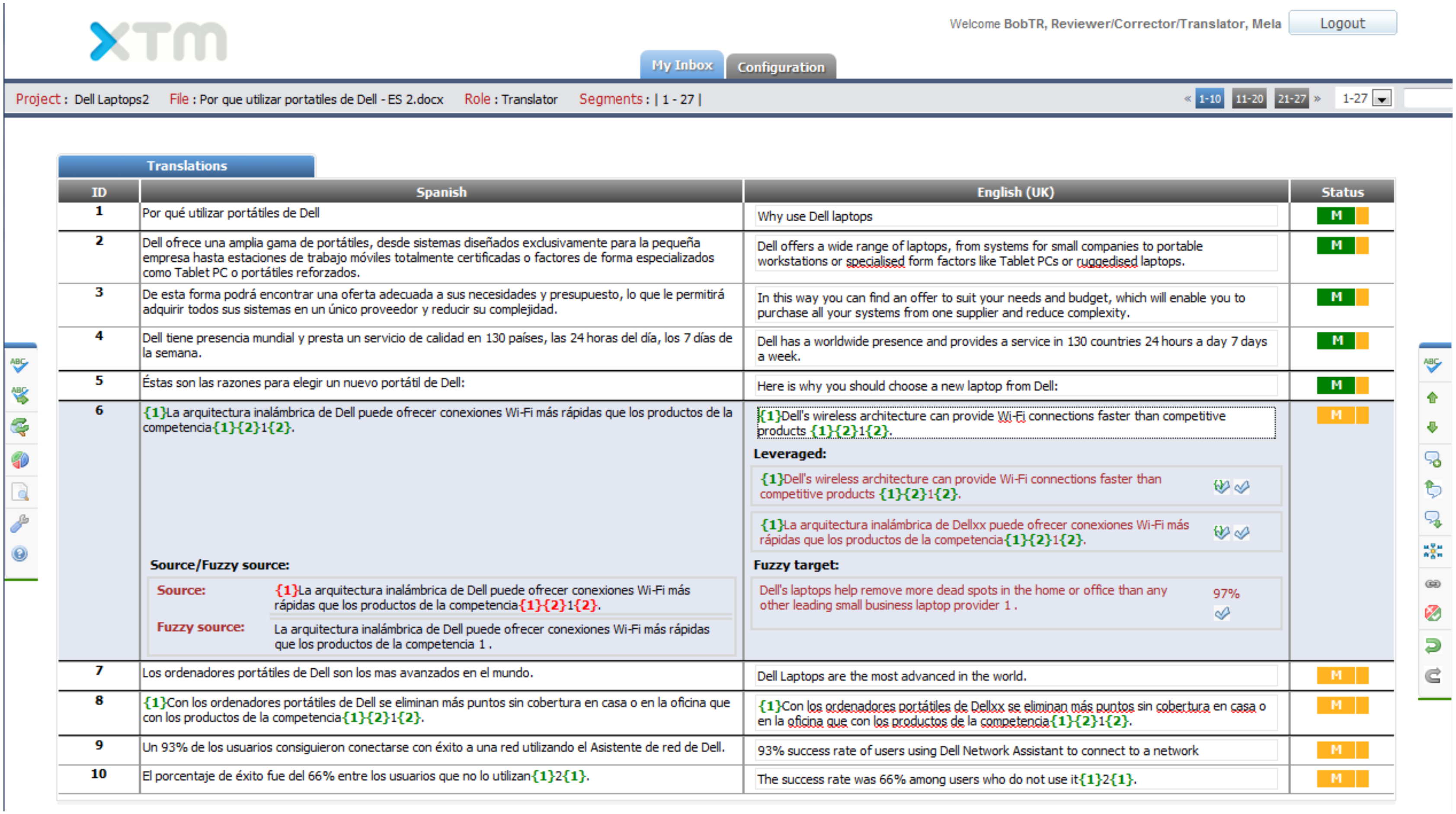
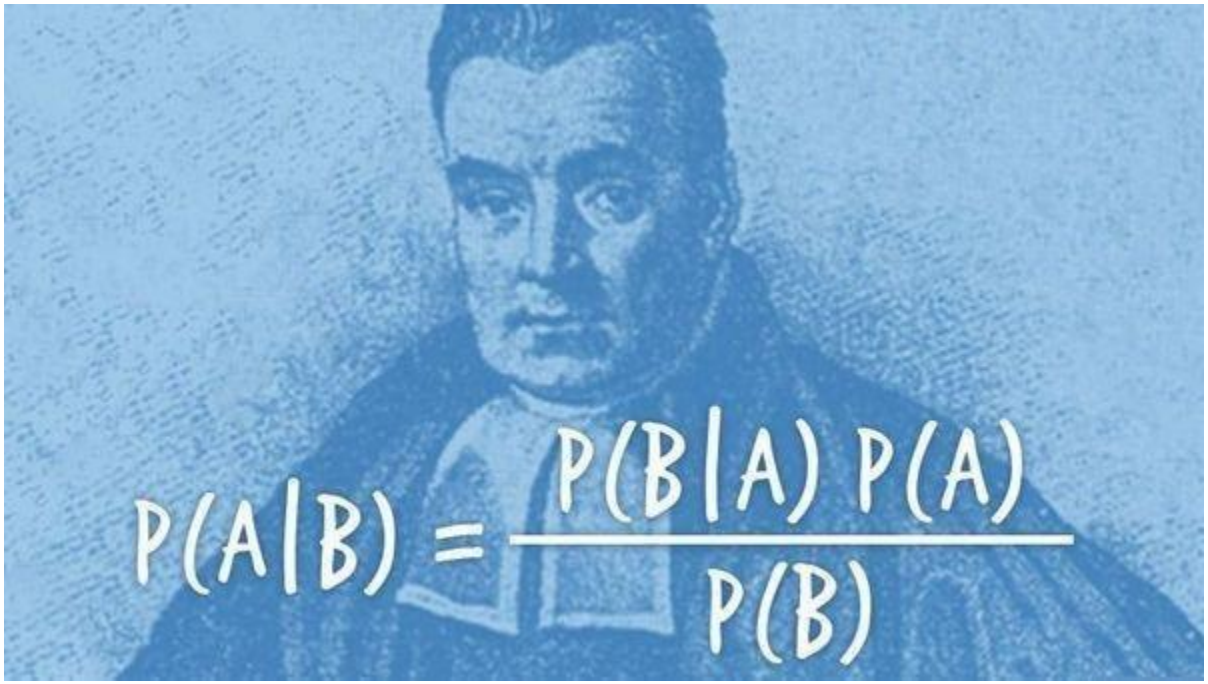
Expert Systems: knowledge based



Expert Systems: Basic pattern matching

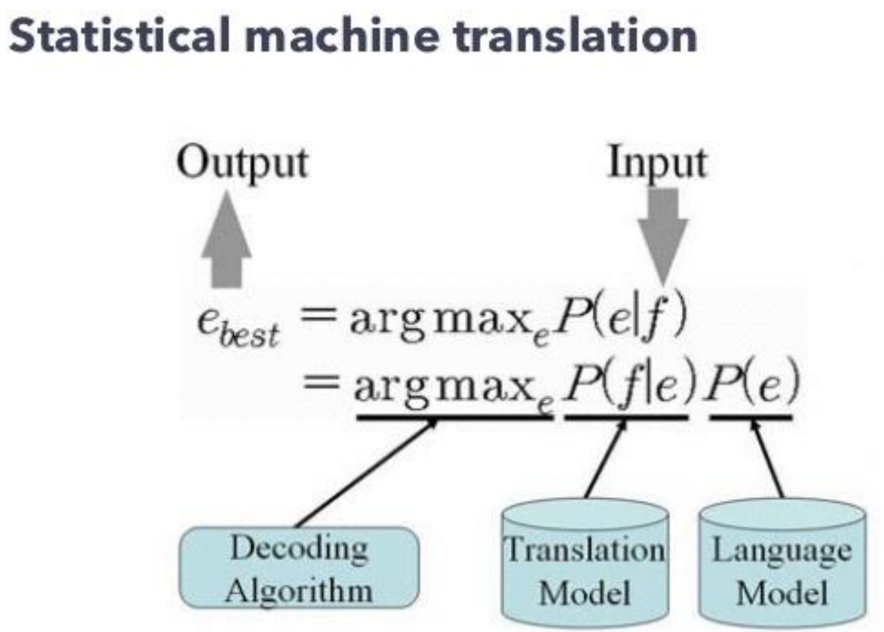


Machine Learning: Bayesian Systems



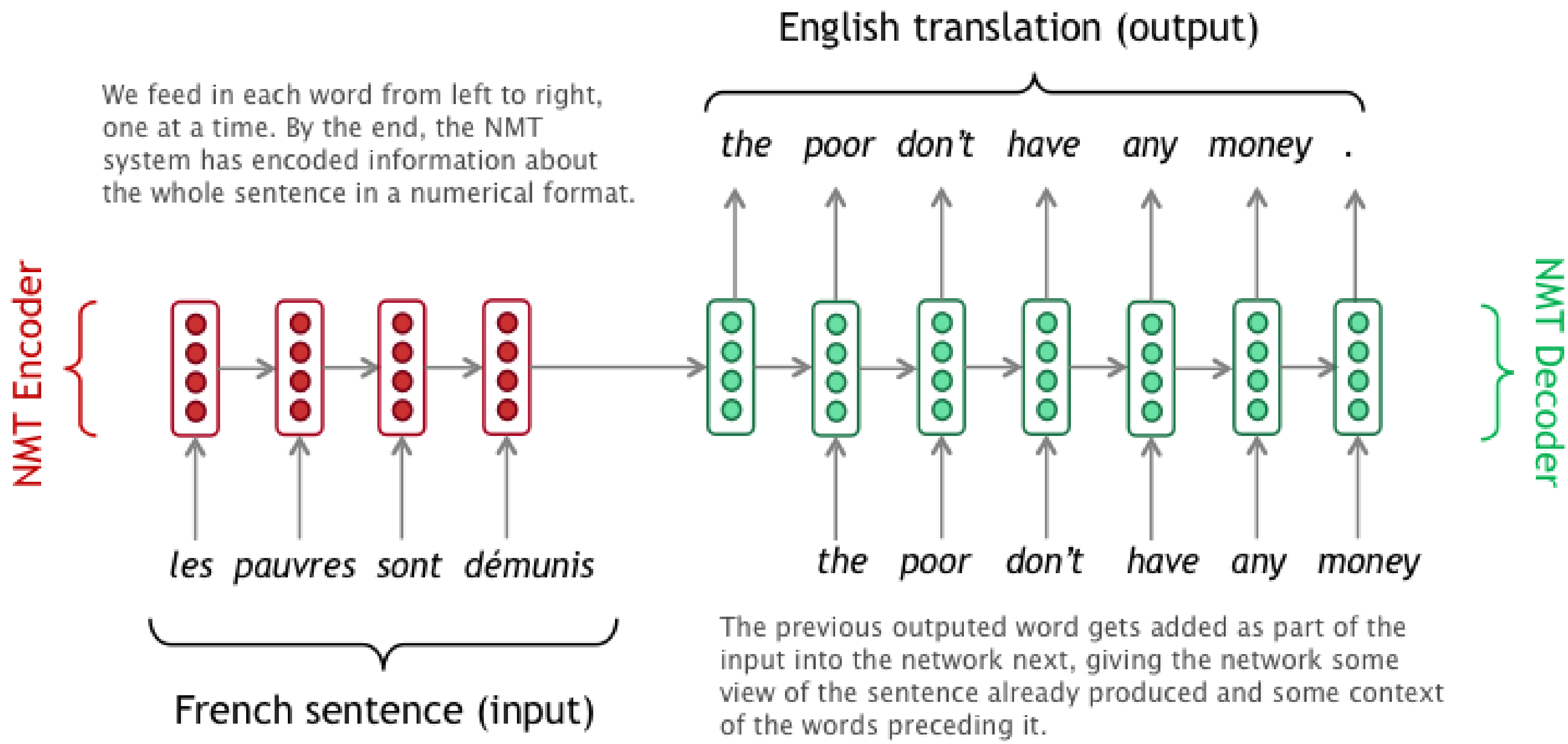
Rev T. Bayes, 1701 - 1761

Machine Learning: Statistical Probability



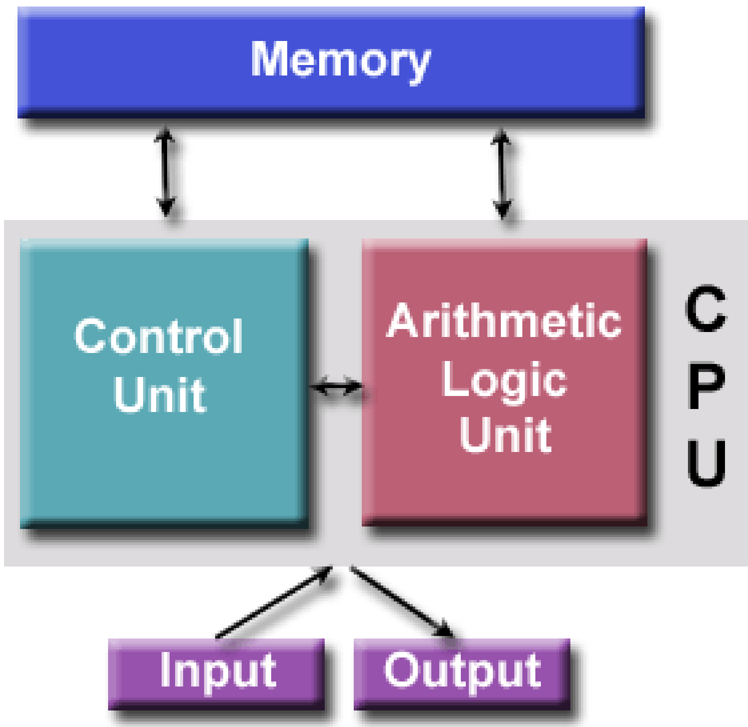
Statistical Machine Translation - SMT

Machine Learning: Neural Networks

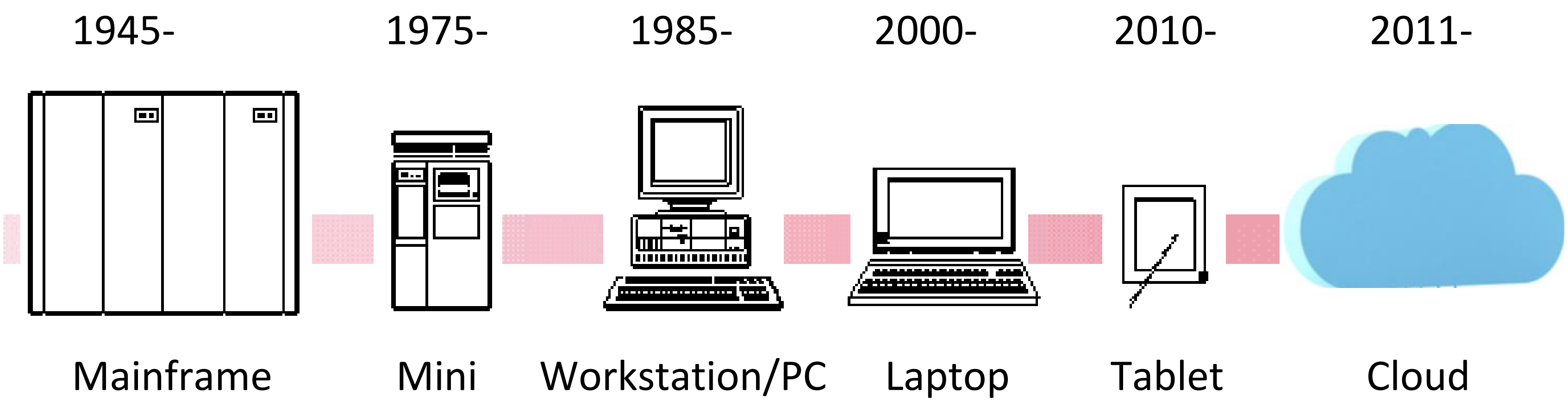


Neural Machine Translation - NMT

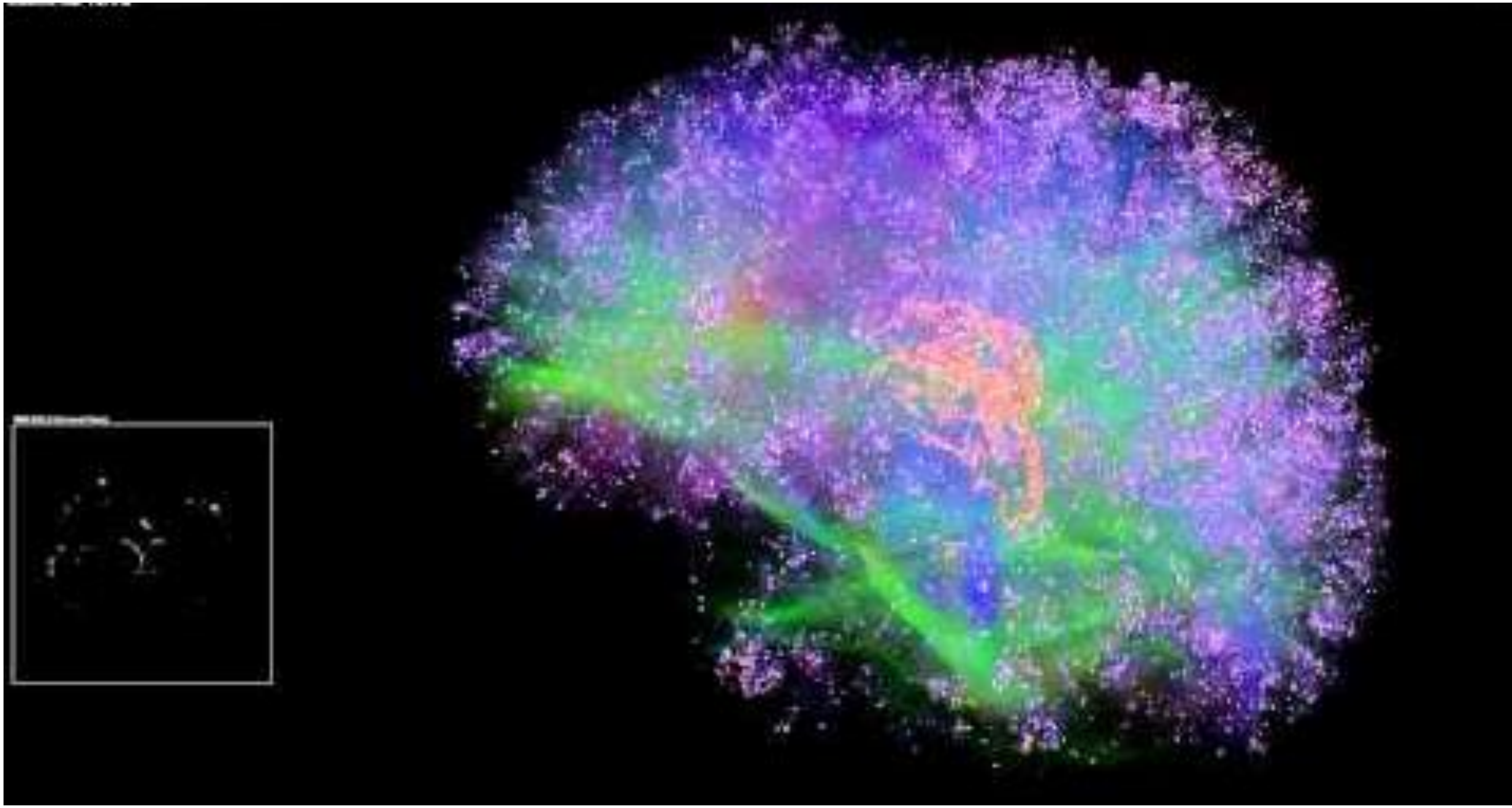
von Neumann architecture



Information Technology Evolution



Unimaginable Scales



30 billion cells, 100 trillion synapses

Efficiency

Jeopardy!

= 80 Watts

= 90,000 Watts

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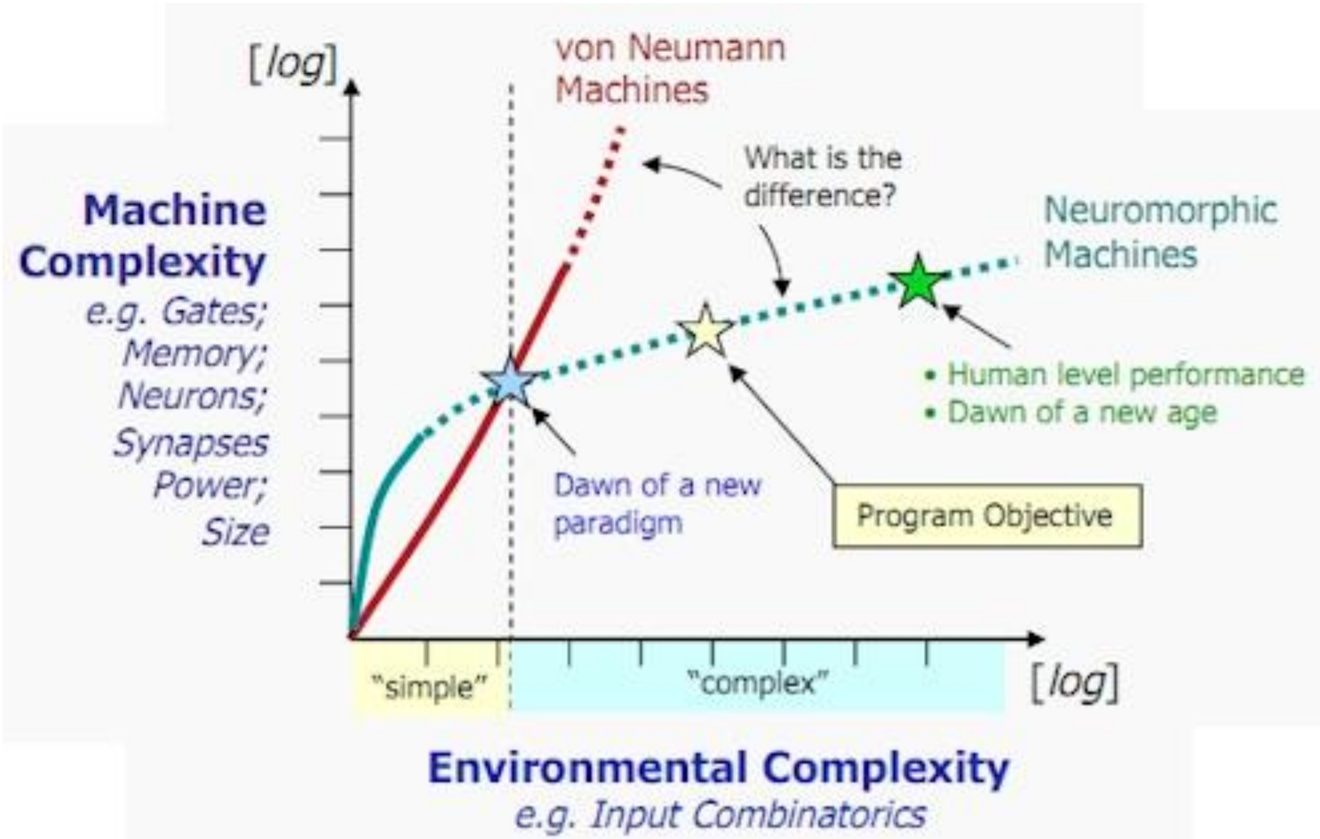
von Neumann architecture
limitations

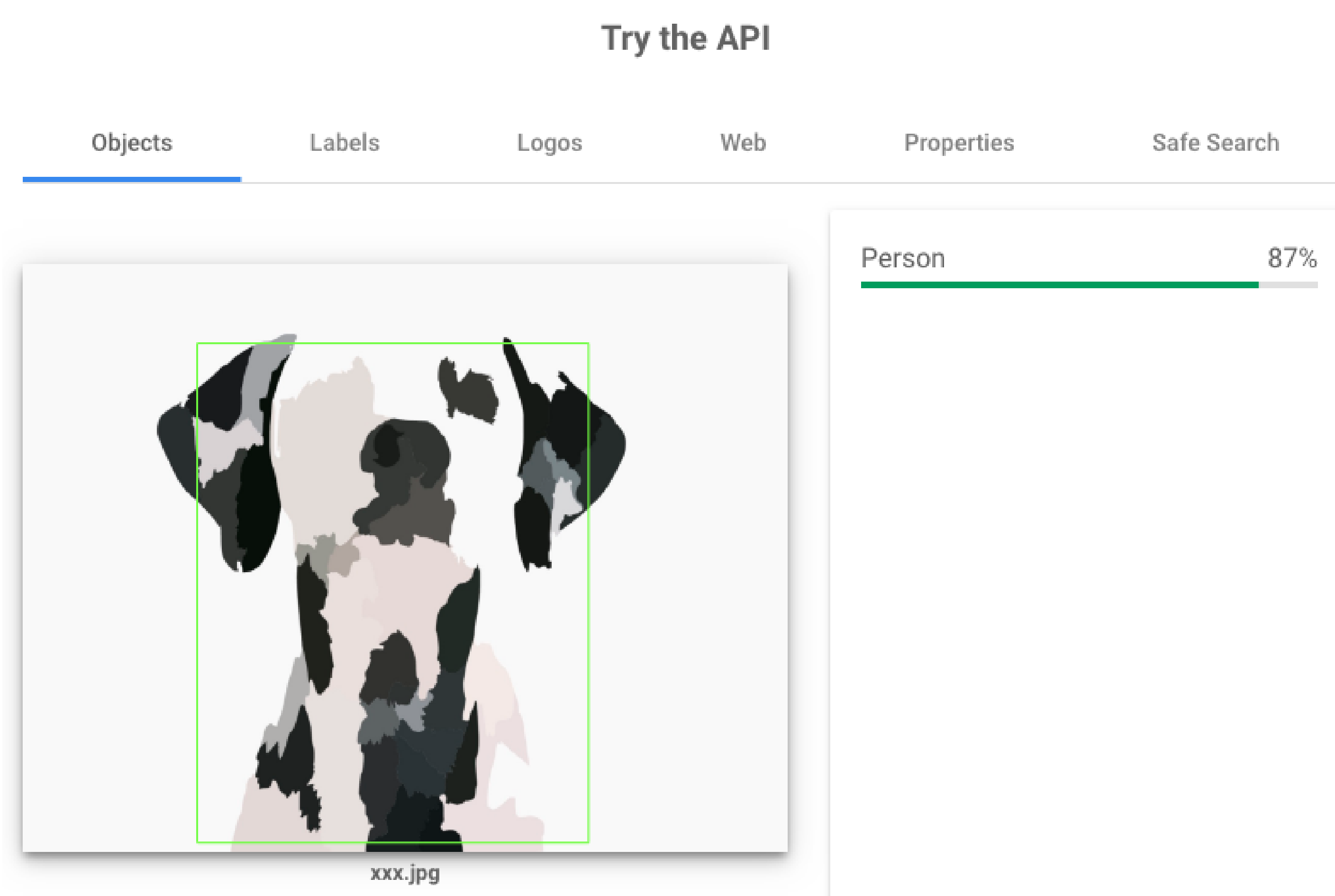
Very Good

Not so good

von Neuman architecture does not scale

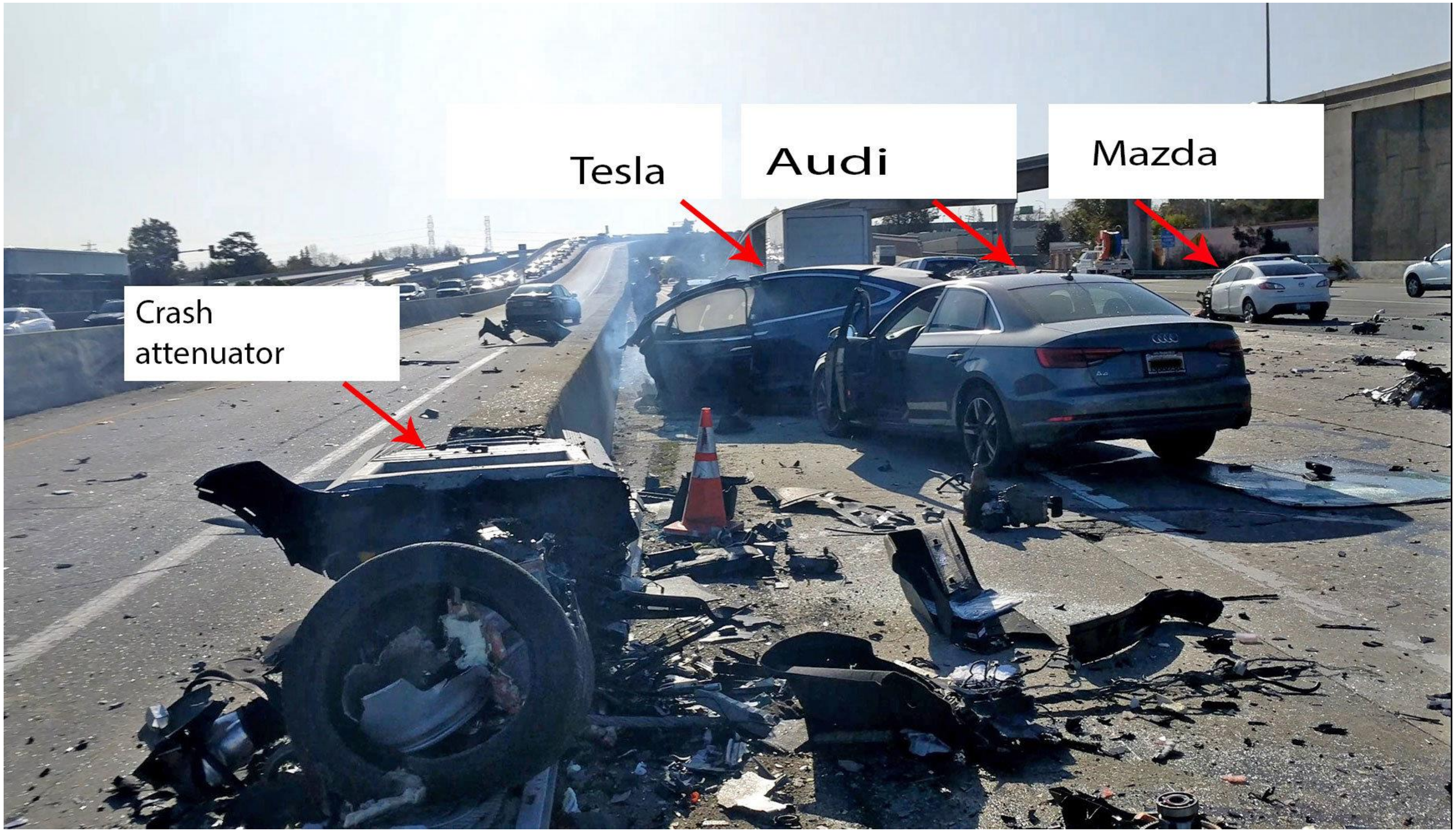


Person!

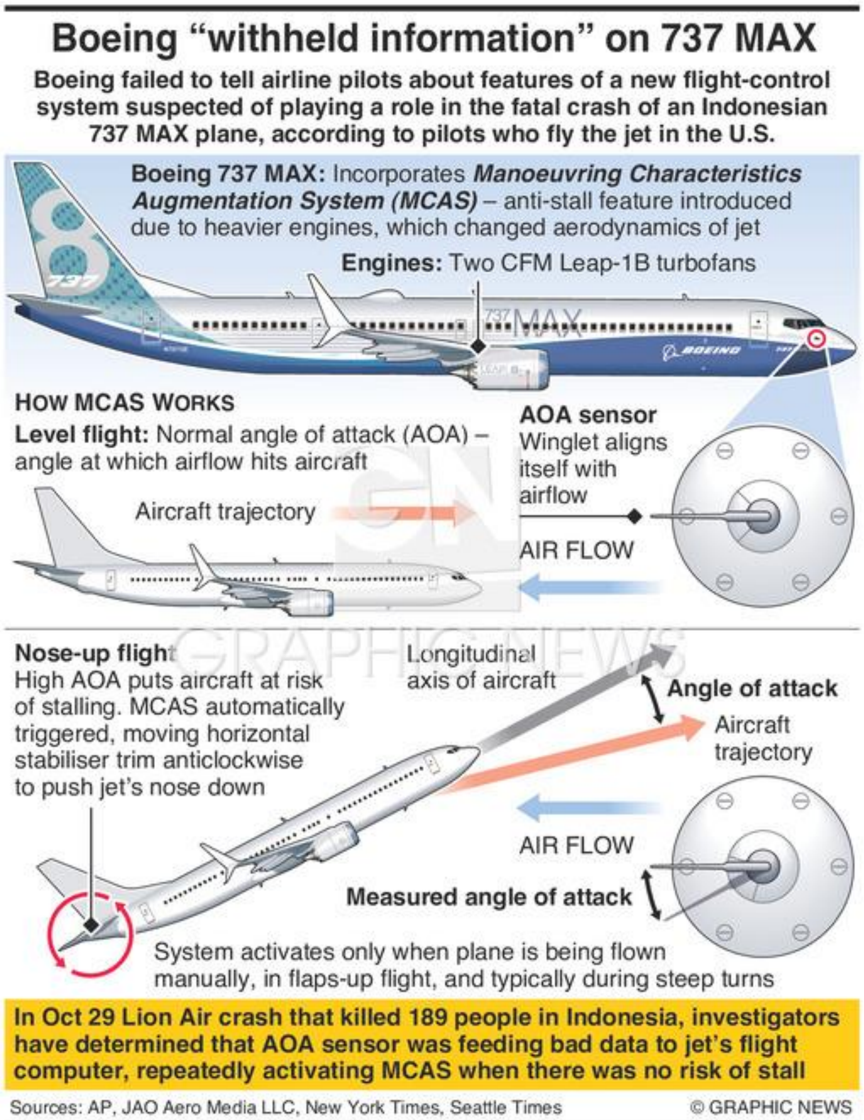


Try the API
Objects
Labels
Logos
Web
Properties
Safe Search
xxx.jpg
Person
87%

80% rule: Tesla autopilot fail



What were they thinking?

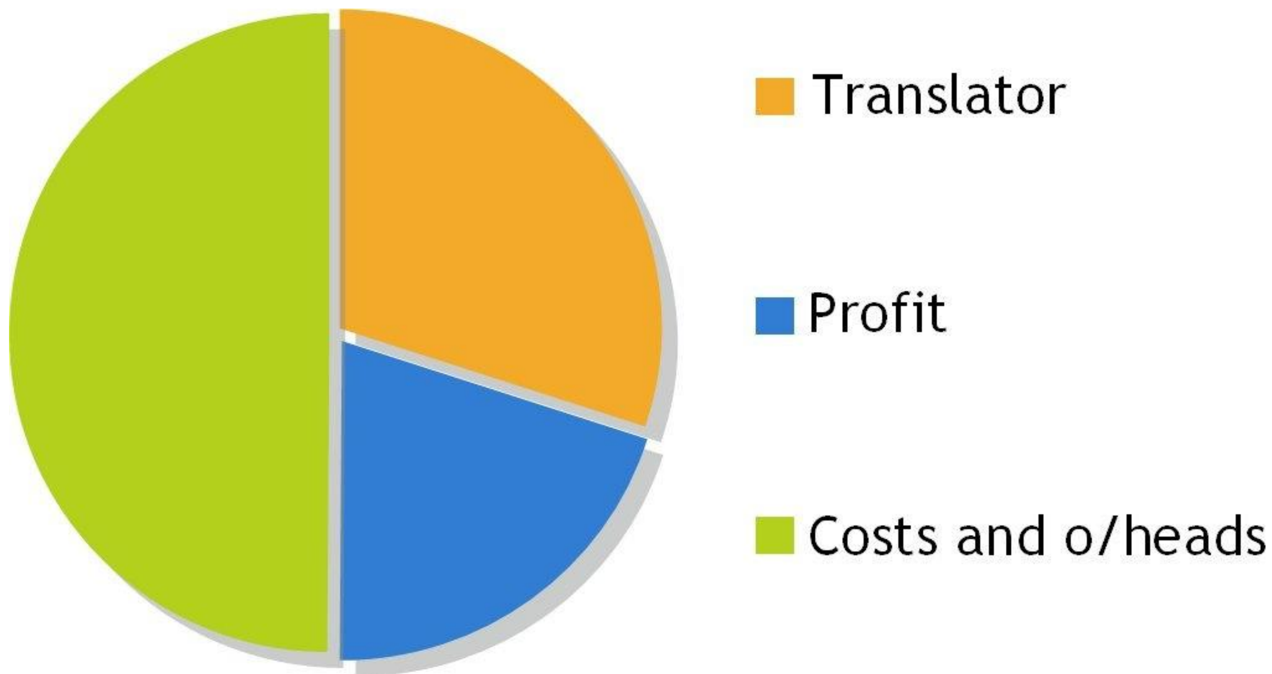


AI in Localization

Expert Systems

1. Automated Workflow
2. Translation Memory
    a. ICE matching
    b. Leveraged
    c. Fuzzy matching
3. Terminology Extraction, including Bilingual
4. Intelligent Corpus Alignment
5. Intelligent Decision Making: which translations to proofread

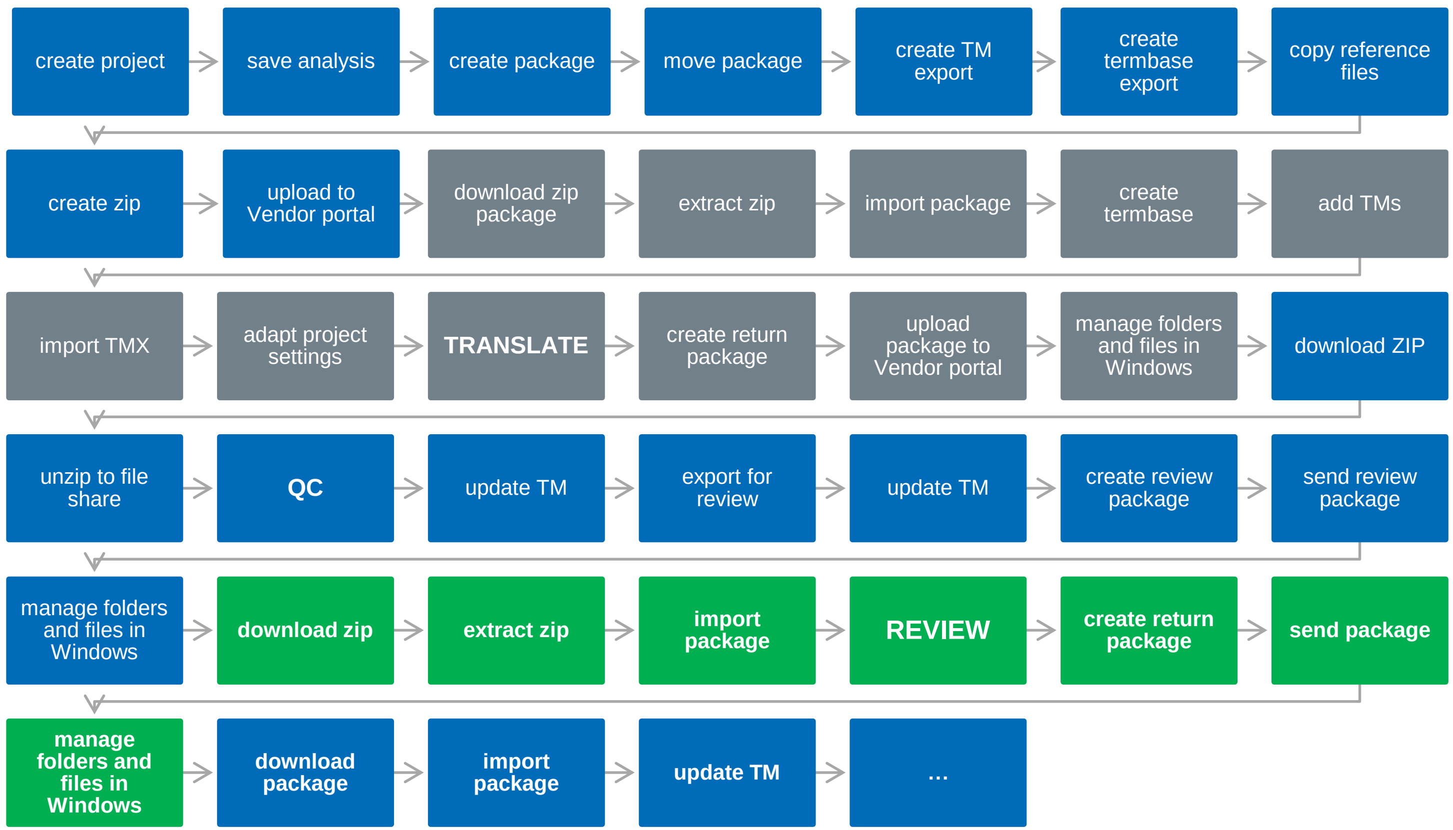
Putting Things Into Perspective



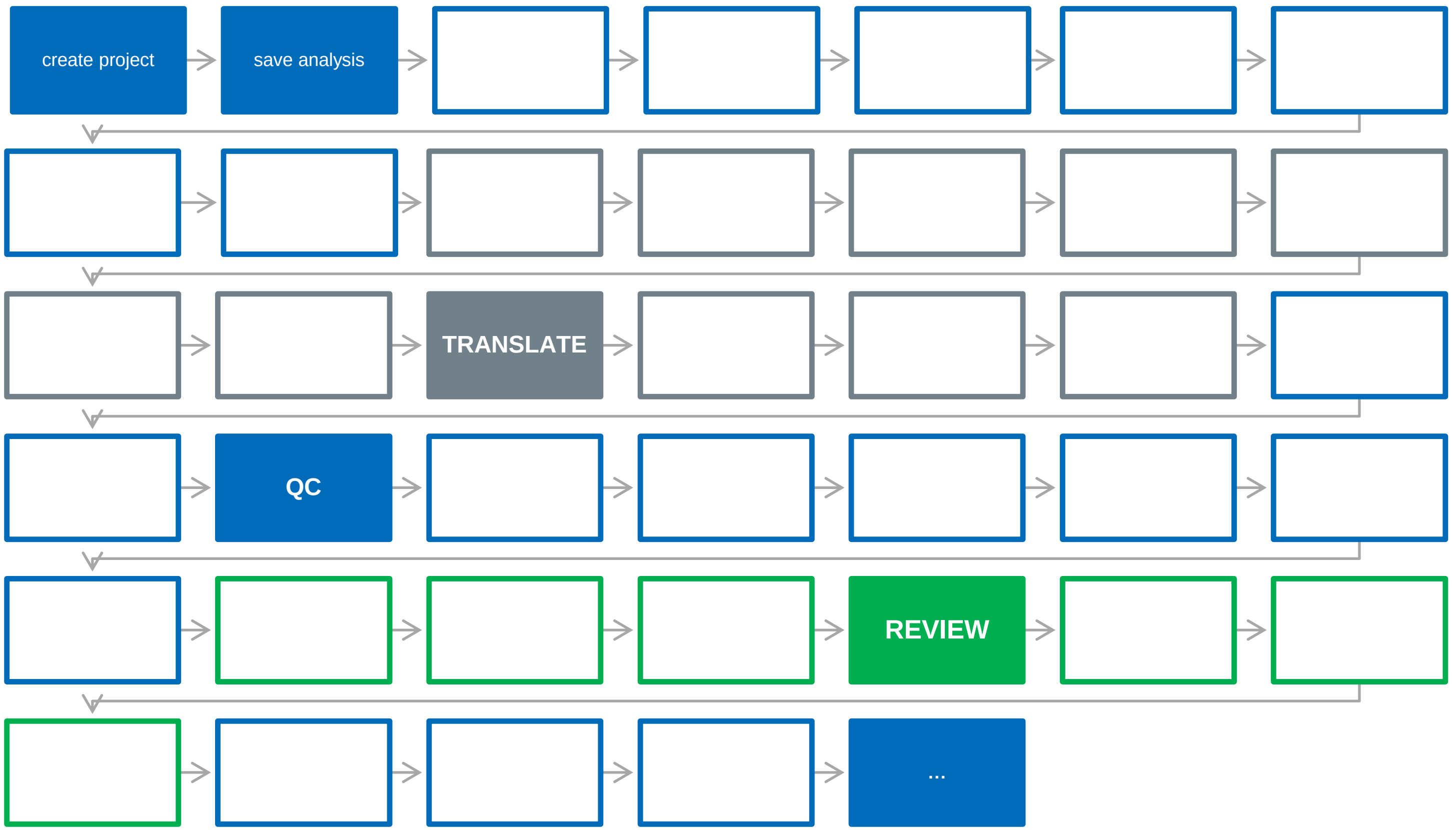
Source Professor Reinhard Schäler LRC - ASLIB 2002

Complex Workflows with Offline Data

Offline Work = Cumbersome File Management



Automated Workflow

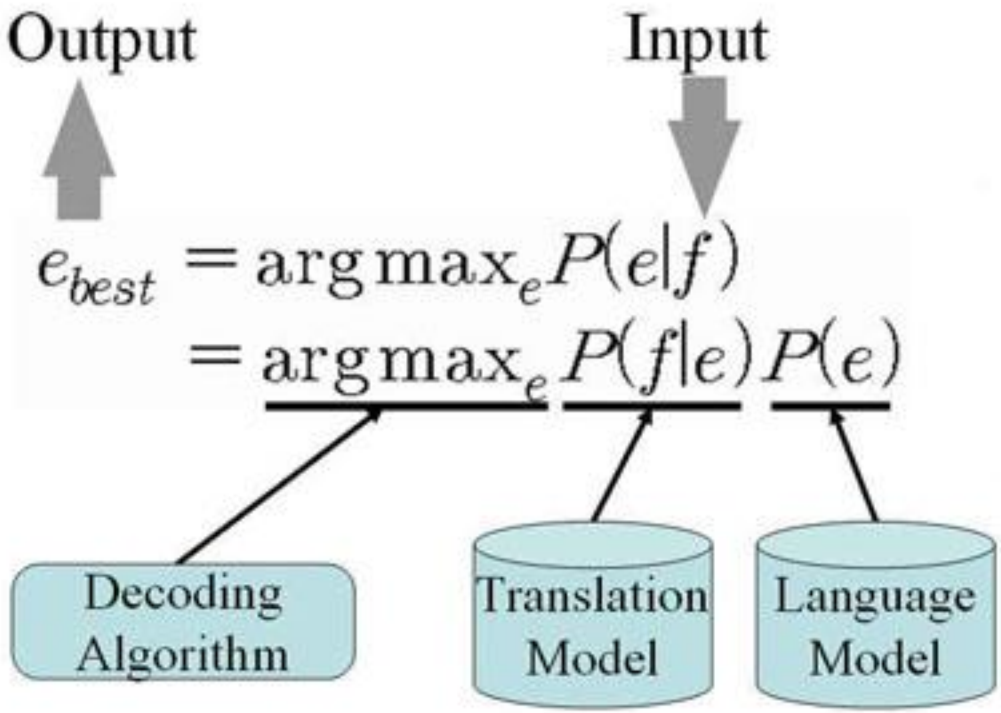


AI in Localization

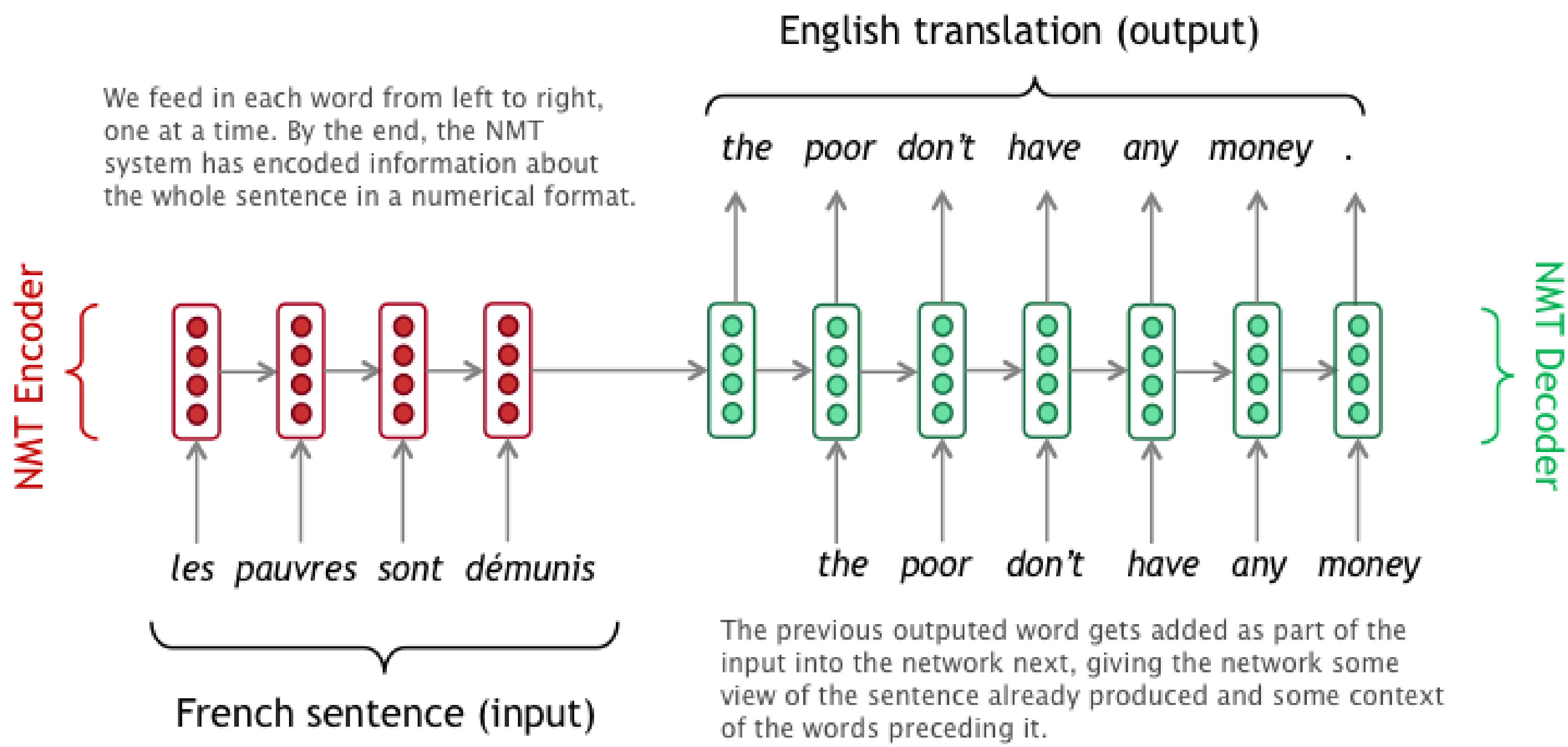
Bayesian probabilities

1. MT post editing: recognizing common patterns
2. Automated placement of inline elements
3. Dynamic sub-segment phrase matching
4. Learning translation

Statistical MT



Neural MT: Deep Learning



Question and Answer session