

RESEARCH REPORT

NOTE: This document is a free excerpt of a larger research report. If you are interested in purchasing the full report, please contact Tractica at sales@tractica.com.

EXECUTIVE SUMMARY

Artificial Intelligence Market Forecasts

191 Consumer, Enterprise, and Government Use Cases for Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Machine Reasoning, and Strong AI Across 27 Industry Sectors

Published 3Q 2016

ADITYA KAUL
Research Director

CLINT WHEELOCK
Managing Director

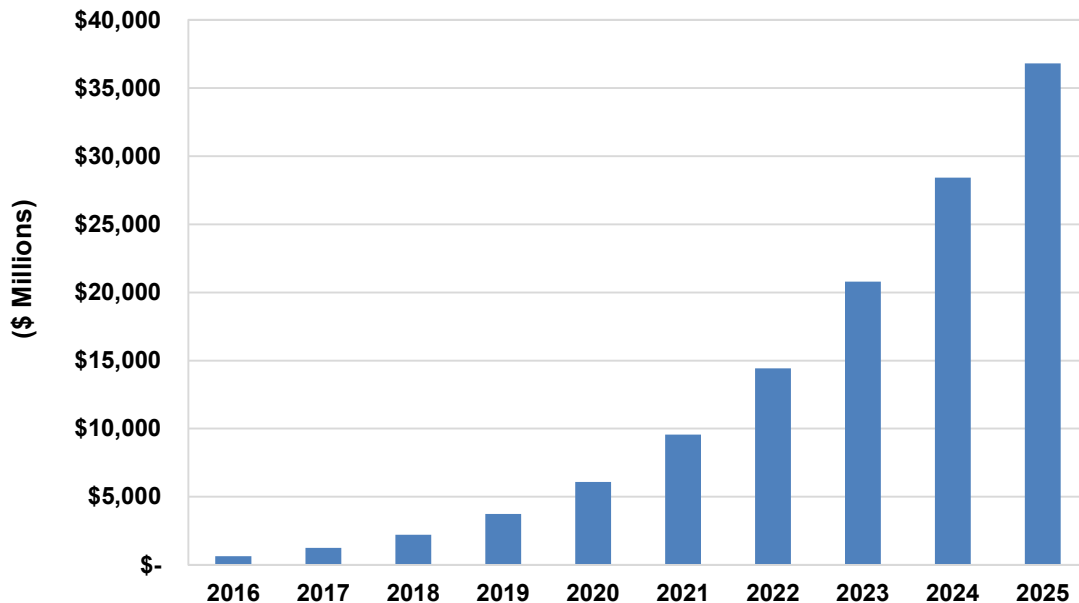
SECTION 1

EXECUTIVE SUMMARY

1.1 INTRODUCTION

Artificial intelligence (AI) is an umbrella term that includes multiple technologies, such as machine learning, deep learning, computer vision, natural language processing (NLP), machine reasoning, and strong AI. Tractica defines AI as an information system that is inspired by a biological system designed to give computers the human-like abilities of hearing, seeing, reasoning, and learning. AI has applications and use cases in almost every industry vertical and is considered the next big technological shift, similar to past shifts like the industrial revolution, the computer age, and the smartphone revolution. Tractica has identified 27 industries spanning 191 use cases where AI is being used today, or will be used in the near future.

Chart 1.1 Artificial Intelligence Revenue, World Markets: 2016-2025



(Source: Tractica)

The market forecast is focused on identifying the revenue opportunity for AI, building a bottom-up, use case based model that classifies and estimates the revenue potential of each use case and folds it up by industry, technology, and region to estimate the overall market. Each use case is identified as a direct or indirect revenue generator for AI. One is the direct application of AI wherein the revenue represents the income derived from the direct sale of an AI product or service, and the second is the indirect application of AI, where AI is essentially seen as a layer or plugin that improves an existing product or service, and the revenue generated from the use case cannot be fully attributed to AI. In the indirect case, the corresponding revenue figure among the entities consuming or developing internal AI software, hardware, or services is a cost budget.

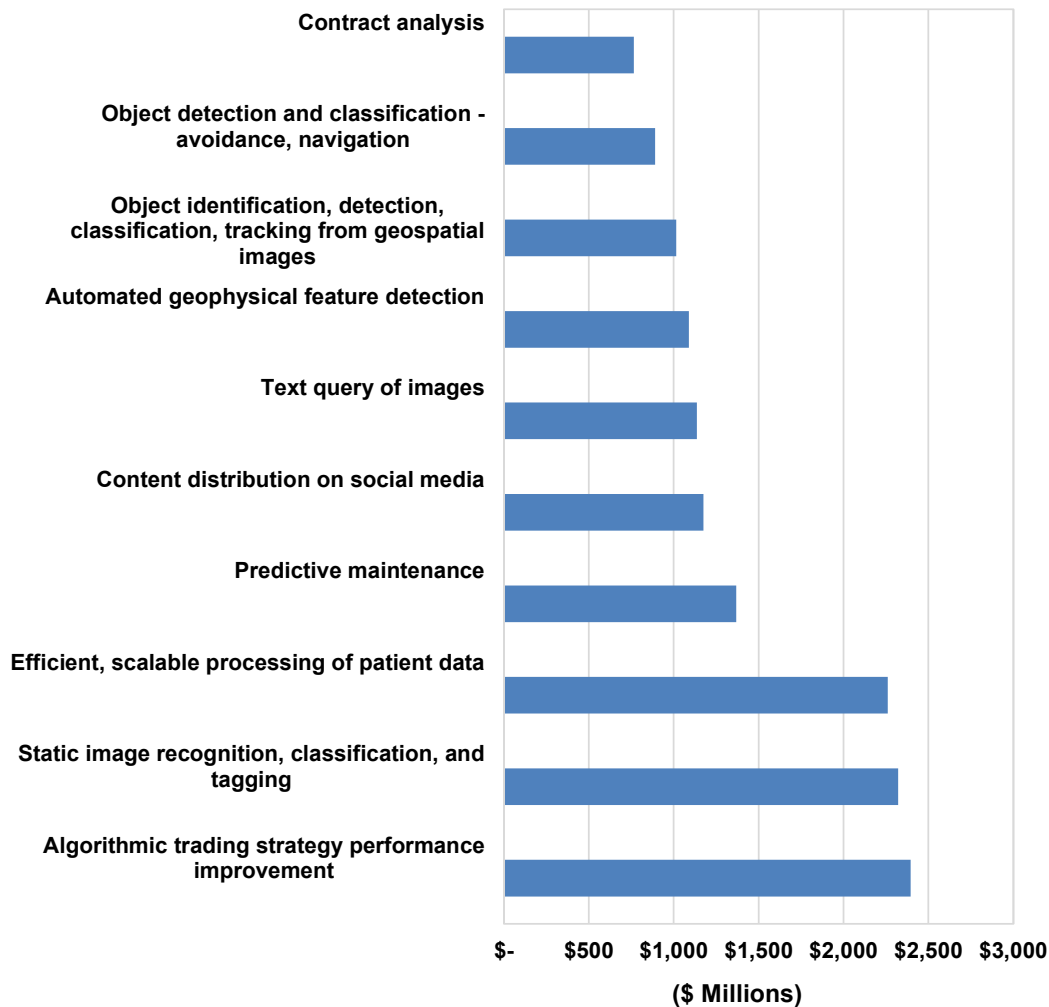
Tractica forecasts that the revenue generated from the direct and indirect application of AI software is estimated to grow from \$643.7 million in 2016 to \$36.8 billion by 2025. This represents a significant growth curve for the 9-year period with a compound annual growth rate (CAGR) of 56.8%.

AI is seen as a black box that is able to process large amounts of data at scale, able to identify anomalies, predict future outcomes, or better optimize processes. The era of big data is driving a lot of the growth in AI, especially in industries like finance, manufacturing, investment, business, healthcare, and advertising. Machine learning and particularly deep learning has seen rapid advances, allowing algorithms to be trained and providing insights at scale. Deep learning using neural networks and techniques such as supervised, unsupervised, and reinforcement learning have extended the capabilities of computers from simply being good at crunching large amounts of data, to becoming more human-like when it comes to the senses of sight and speech. Image recognition and speech recognition are two areas that are seeing rapid advances and will have a major impact across the consumer, automotive, advertising, healthcare, defense, and media & entertainment industries, among others.

Overall, Tractica expects that deep learning will be the largest technology category in terms of revenue, with the majority of use cases using deep learning or a combination of deep learning and other technologies like machine learning, computer vision, NLP, or machine reasoning. Deep learning revenue is estimated to grow from \$308.4 million in 2016 to \$16 billion by 2025, which will represent 44% of the overall AI market in 2025. However, the biggest application of deep learning is in combination with classical machine learning. Combined, deep learning and classical machine learning will represent 67% of the AI market by 2025.

1.2 USE CASE HIGHLIGHTS

The chart below shows the top 10 AI use cases in terms of revenue in 2025. The number one use case in terms of revenue, according to Tractica, is expected to be algorithmic trading strategy and performance, with the investment and hedge fund community embracing AI algorithms. Tractica has assumed a somewhat conservative adoption of AI in the hedge fund and investment community, with an assumption that roughly 50% of the hedge fund assets traded by 2025 will be AI-driven. Even with the conservative estimate, the algorithmic trading use case remains the top use case among the 191 use cases identified by Tractica.

Chart 1.2 Artificial Intelligence Revenue, Top 10 Use Cases, World Markets: 2025


(Source: Tractica)

Image recognition and object identification use cases also feature among the top 10, which includes automated geophysical feature detection that is being used in the oil, gas, and mining industry. Computer vision features in 4 of the 10 use cases. NLP is also one of the leading technologies in use among the top 10, with usage in efficient, scalable processing of patient data and contract analysis. Predictive maintenance is the fourth most valuable use case in terms of revenue, with major application in manufacturing and the Internet of Things (IoT), using both machine learning and deep learning techniques. Content distribution on social media is also estimated to be a high-value use case, which is linked to the rise and dominance of social media as a distribution and advertising medium. Out of the top 10 use cases, 60% of the use cases are related to big data and 40% are related to image or object recognition, which is a good high-level characterization of how the market is expected to shape up. In total, the top 10 use cases will account for approximately 40% of the overall AI software market revenue in 2025, representing \$14 billion in value.

SECTION 5

TABLE OF CONTENTS

SECTION 1	1
Executive Summary	1
1.1 Introduction.....	1
1.2 Use Case Highlights.....	2
SECTION 2	4
Definitions and Scope	4
2.1 Definition of Artificial Intelligence	4
2.2 Artificial Intelligence Technologies - Definitions and Scope	4
2.2.1 Revenue	4
2.2.2 Technologies	5
2.3 Forecast Model.....	5
SECTION 3	7
Market Data Highlights	7
3.1 Regional Highlights	7
3.2 Industry Highlights.....	9
3.3 Technology Market Highlights.....	12
3.4 AI-Driven Services Revenue	15
3.5 AI-Driven Hardware and Cloud Revenue.....	16
SECTION 4	17
Acronym and Abbreviation List	17
SECTION 5	18
Table of Contents	18
SECTION 6	19
Table of Charts and Figures	19
SECTION 7	20
Scope of Study	20
Sources and Methodology	20
Notes	21

SECTION 6

TABLE OF CHARTS AND FIGURES

Chart 1.1	Artificial Intelligence Revenue, World Markets: 2016-2025	1
Chart 1.2	Artificial Intelligence Revenue, Top 10 Use Cases, World Markets: 2025.....	3
Chart 3.1	Artificial Intelligence Revenue by Region, World Markets: 2016-2025	7
Chart 3.2	Artificial Intelligence Revenue Share by Industry, World Markets: 2016	9
Chart 3.3	Artificial Intelligence Revenue Share by Industry, World Markets: 2025	10
Chart 3.4	Artificial Intelligence Revenue by Industry, World Markets: 2016-2025.....	11
Chart 3.5	Annual Artificial Intelligence Revenue by Technology, World Markets: 2016-2025.....	14
Chart 3.6	AI-Driven Services Revenue by Service Category, World Markets: 2016-2025.....	15
Chart 3.7	AI-Driven Hardware Revenue by Hardware Category, World Markets: 2016-2025	16
Chart 7.1	Tractica Research Methodology.....	21
Table 3.1	AI Technology Categories and Combinations.....	12

SECTION 7

SCOPE OF STUDY

This Tractica report provides a quantitative assessment of the market opportunity for artificial intelligence across the consumer, enterprise, and government sectors. The report includes market sizing, segmentation, and forecasts for 191 specific AI use cases and the 27 industries in which they will play a role. The market forecasts span the period from 2016 through 2025 and include segmentation by the six fundamental AI technologies: machine learning, deep learning, computer vision, natural language processing, machine reasoning, and strong AI. Revenue forecasts are further segmented by software, hardware, and services in addition to segmentation by world region.

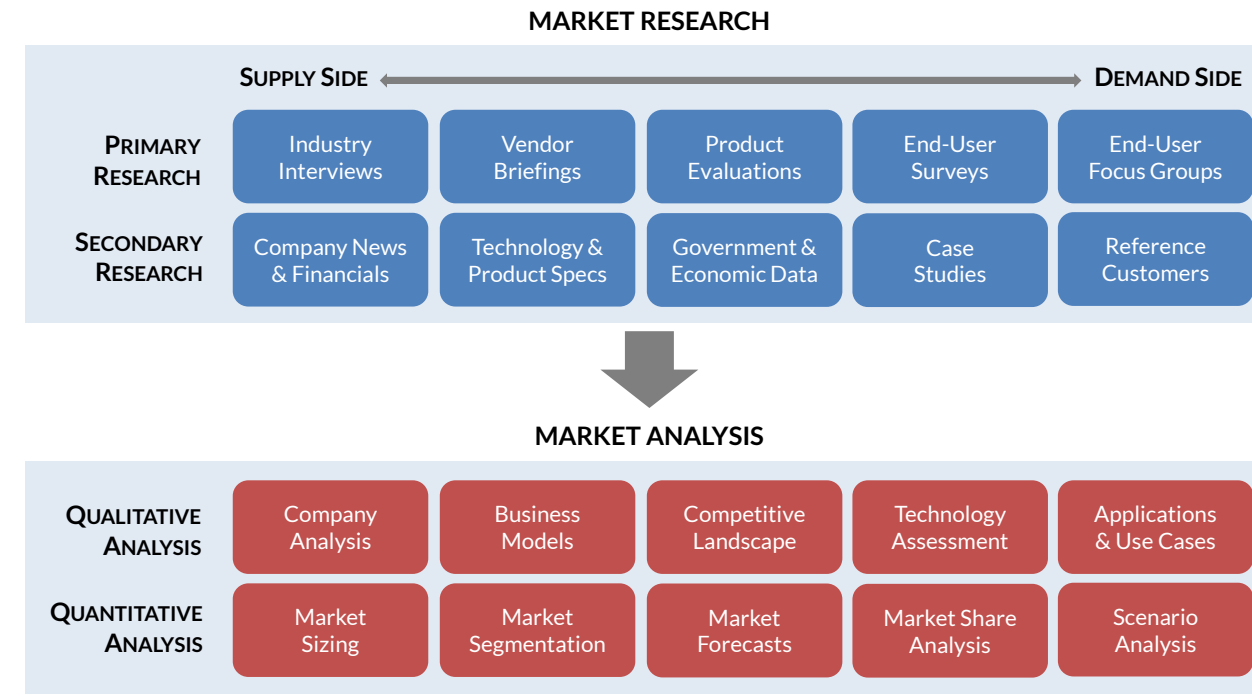
SOURCES AND METHODOLOGY

Tractica is an independent market research firm that provides industry participants and stakeholders with an objective, unbiased view of market dynamics and business opportunities within its coverage areas. The firm's industry analysts are dedicated to presenting clear and actionable analysis to support business planning initiatives and go-to-market strategies, utilizing rigorous market research methodologies and without regard for technology hype or special interests including Tractica's own client relationships. Within its market analysis, Tractica strives to offer conclusions and recommendations that reflect the most likely path of industry development, even when those views may be contrarian.

The basis of Tractica's analysis is primary research collected from a variety of sources including industry interviews, vendor briefings, product demonstrations, and quantitative and qualitative market research focused on consumer and business end-users. Industry analysts conduct interviews with representative groups of executives, technology practitioners, sales and marketing professionals, industry association personnel, government representatives, investors, consultants, and other industry stakeholders. Analysts are diligent in pursuing interviews with representatives from every part of the value chain in an effort to gain a comprehensive view of current market activity and future plans. Within the firm's surveys and focus groups, respondent samples are carefully selected to ensure that they provide the most accurate possible view of demand dynamics within consumer and business markets, utilizing balanced and representative samples where appropriate and careful screening and qualification criteria in cases where the research topic requires a more targeted group of respondents.

Tractica's primary research is supplemented by the review and analysis of all secondary information available on the topic being studied, including company news and financial information, technology specifications, product attributes, government and economic data, industry reports and databases from third-party sources, case studies, and reference customers. As applicable, all secondary research sources are appropriately cited within the firm's publications.

All of Tractica's research reports and other publications are carefully reviewed and scrutinized by the firm's senior management team in an effort to ensure that research methodology is sound, all information provided is accurate, analyst assumptions are carefully documented, and conclusions are well-supported by facts. Tractica is highly responsive to feedback from industry participants and, in the event errors in the firm's research are identified and verified, such errors are corrected promptly.

Chart 7.1 Tractica Research Methodology


(Source: Tractica)

NOTES

CAGR refers to compound annual growth rate, using the formula:

$$\text{CAGR} = (\text{End Year Value} \div \text{Start Year Value})^{(1/\text{steps})} - 1.$$

CAGRs presented in the tables are for the entire timeframe in the title. Where data for fewer years are given, the CAGR is for the range presented. Where relevant, CAGRs for shorter timeframes may be given as well.

Figures are based on the best estimates available at the time of calculation. Annual revenues, shipments, and sales are based on end-of-year figures unless otherwise noted. All values are expressed in year 2016 U.S. dollars unless otherwise noted. Percentages may not add up to 100 due to rounding.

Published 3Q 2016

© 2016 Tractica LLC
1111 Pearl Street, Suite 201
Boulder, CO 80302 USA
Tel: +1.303.248.3000
Email: info@tractica.com
www.tractica.com

This publication is provided by Tractica LLC (“Tractica”). This publication may be used only as expressly permitted by license from Tractica and may not otherwise be reproduced, recorded, photocopied, distributed, displayed, modified, extracted, accessed or used without the express written permission of Tractica. Notwithstanding the foregoing, Tractica makes no claim to any Government data and other data obtained from public sources found in this publication (whether or not the owners of such data are noted in this publication). If you do not have a license from Tractica covering this publication, please refrain from accessing or using this publication. Please contact Tractica to obtain a license to this publication.