McKinsey's State Of Machine Learning And AI, 2017

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- Tech giants including Baidu and Google spent between $20B to $30B on AI in 2016, with 90% of this spent on R&D and deployment, and 10% on AI acquisitions.
- Artificial Intelligence (AI) investment has turned into a race for patents and intellectual property (IP) among the world's leading tech companies.
- U.S.-based companies absorbed 66% of all AI investments in 2016. China was second with 17% and growing fast.
- By providing better search results, Netflix estimates that it is avoiding canceled subscriptions that would reduce its revenue by $1B annually.

These and other findings are from the McKinsey Global Institute Study, and discussion paper, Artificial Intelligence, The Next Digital Frontier (80 pp., PDF, free, no opt-in) published last month. McKinsey Global Institute published an article summarizing the findings titled How Artificial Intelligence Can Deliver Real Value To Companies. McKinsey interviewed more than 3,000 senior executives on the use of AI technologies, their companies' prospects for further deployment, and AI's impact on markets, governments, and individuals. McKinsey Analytics was also utilized in the development of this study and discussion paper.

Key takeaways from the study include the following:

- **Tech giants including Baidu and Google spent between $20B to $30B on AI in 2016, with 90% of this spent on R&D and deployment, and 10% on AI acquisitions.** The current rate of AI investment is 3X the external investment growth since 2013. McKinsey found that 20% of AI-aware firms are early adopters, concentrated in the high-tech/telecom, automotive/assembly and financial services industries. The graphic below illustrates the trends the study team found during their analysis.

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Source: McKinsey Global Institute, Artificial Intelligence, The Next Digital Frontier

- **AI is turning into a race for patents and intellectual property (IP) among the world's leading tech companies.** McKinsey found that only a small percentage (up to 9%) of Venture Capital (VC), Private Equity (PE), and other external funding. Of all categories that have publically available data, M&A grew the fastest between 2013 And 2016 (85%).The report cites many examples of internal development including Amazon's

investments in robotics and speech recognition, and Salesforce on virtual agents and machine learning. BMW, Tesla, and Toyota lead auto manufacturers in their investments in robotics and machine learning for use in driverless cars. Toyota is planning to invest $1B in establishing a new research institute devoted to AI for robotics and driverless vehicles.

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Source: McKinsey Global Institute, Artificial Intelligence, The Next Digital Frontier

- **McKinsey estimates that total annual external investment in AI was between $8B to $12B in 2016, with machine learning attracting nearly 60% of that investment.** Robotics and speech recognition are two of the most popular investment areas. Investors are most favoring machine learning startups due to quickness code-based start-ups have at scaling up to include new features fast. Software-based machine learning startups are preferred over their more cost-intensive machine-based robotics counterparts that often don't have their software counterparts do. As a result of these factors and more, Corporate M&A is soaring in this area with the Compound Annual Growth Rate (CAGR) reaching approximately 80% from 20-13 to 2016. The following graphic illustrates the distribution of external investments by category from the study.

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Source: McKinsey Global Institute, Artificial Intelligence, The Next Digital Frontier

- **High tech, telecom, and financial services are the leading early adopters of machine learning and AI.** These industries are known for their willingness to invest in new technologies to gain competitive and internal process efficiencies. Many startups have also had their start by concentrating on the digital challenges of this industries as well. The MGI Digitization Index is a GDP-weighted average of Europe and the United States. See Appendix B of the study for a full list of metrics and explanation of methodology. McKinsey also created an overall AI index shown in the first column below that compares key performance indicators (KPIs) across assets, usage, and labor where AI could make a contribution. The following is a heat map showing the relative level of AI adoption by industry and key area of asset, usage, and labor category.

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Source: McKinsey Global Institute, Artificial Intelligence, The Next Digital Frontier

- **McKinsey predicts High Tech, Communications, and Financial Services will be the leading industries to adopt AI in the next three years.** The competition for patents and intellectual property (IP) in these three industries is accelerating. Devices, products and services available now and on the roadmaps of leading tech companies will over time reveal the level of innovative activity going on in their R&D labs today. In financial services, for example, there are clear benefits from improved accuracy and speed in AI-optimized fraud-detection systems, forecast to be a $3B market in 2020. The following graphic provides an overview of sectors or industries leading in AI addition today and who intend to grow their investments the most in the next three years.

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Source: McKinsey Global Institute, Artificial Intelligence, The Next Digital Frontier

- **Healthcare, financial services, and professional services are seeing the greatest increase in their profit margins as a result of AI adoption.** McKinsey found that companies who benefit from senior management support for AI initiatives have invested in infrastructure to support its scale and have clear business goals achieve 3 to 15% percentage point higher profit margin. Of the over 3,000 business leaders who were interviewed as part of the survey, the majority expect margins to increase by up to 5% points in the next year.

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Source: McKinsey Global Institute, Artificial Intelligence, The Next Digital Frontier

- **Amazon has achieved impressive results from its $775 million acquisition of Kiva, a robotics company that automates picking and packing according to the McKinsey study.** “Click to ship” cycle time, which ranged from 60 to 75 minutes with humans, fell to 15 minutes with Kiva, while inventory capacity increased by 50%. Operating costs fell an estimated 20%, giving a return of close to 40% on the original investment

- **Netflix has also achieved impressive results from the algorithm it uses to personalize recommendations to its 100 million subscribers worldwide.** Netflix found that customers, on average, give up 90 seconds after searching for a movie. By improving search results, Netflix projects that they have avoided canceled subscriptions that would reduce its revenue by $1B annually.