

AI for Code:
The Next Big Milestone
in Digital Business

White Paper

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The modern enterprise is built on the backbone of digital innovation, continually pivoting towards new areas and practices. Powering this entire framework is a robust and intricate application landscape, designed to delight both internal and external users. In fact, the number of applications deployed by large firms globally has increased by 68% in the last four years.

With the global technology landscape changing so rapidly, however, traditional application development models cannot keep up. Not only do they require an extremely high degree of manual intervention, the level of security and testing coverage frequently falls short. This results in sub-par application performance, reducing productivity and agility for the enterprise. That's why the rising trend of artificial intelligence (AI) in application development is so vital. Powered by AI for code, developers, application owners, and business leaders can achieve high performance and enterprise agility like never before.

Understanding the role of AI in Application Development and Maintenance

Despite the growing popularity of SaaS products and off-the-shelf software, homegrown applications still carry major heft. It is estimated that 40% of critical solutions at the world's top-performing organizations are developed in-house. This implies massive coding efforts, often devoted to iterative tasks that could be simplified by automation. But is it possible to combine the efficiency of automation with human-level expertise? That is exactly what AI for code tries to achieve.

AI-augmented application development deploys AI and machine learning (ML) to aid developers in the production and delivery of software applications. And this extends beyond the coding stage. From strategic decisions around application development to application testing and design, there are four discrete areas where AI makes a genuine difference.

Website and software design

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The design stage is probably the one requiring the most human effort, involving creative, strategic, and domain-specific expertise. AI has the potential to understand business requirements and recommend the best-fit software for website design. There's already an example of this, launched by Bookmark, called the Artificial Intelligence Design Assistant (AiDA). Its proprietary machine learning algorithms spit out smart predictions as to the optimal website layout, in alignment with an application owner's specific industry.



2

AI-led strategic application decisions

During conceptualization, developers, and product managers must go through a protracted brainstorming process where necessary features are identified and prioritized. This is followed by a thorough risk assessment, identifying which solutions would help to maximize impact while keeping risk at a bare minimum. AI and ML can help convert business requirements into executable technology specifications. This ensures alignment with business use cases, ensuring long-term relevance for the application.

3

Testing for application performance and usability

Testing is one of the most effort-intensive development tasks, adding new test cycles with every application iteration. An innovation-focused enterprise will inevitably refine the source code at regular intervals – however, identifying change areas and testing for performance can be a cumbersome activity. Another area of challenge is GUI. Formulating test cases for GUI code and ensuring test coverage depends entirely on the human developer. Using AI, it is possible to predict test cases and synchronize application behavior with end-user expectations.

4

Automated code generation and development assistance

Here is where the potential of AI for code truly shines. Building an application from scratch requires a significant time, often extending to months and even years. For large-scale enterprises that are looking to gain a competitive advantage, this delay in time-to-market is unacceptable. AI tools recognize coding patterns and auto-recommend the next line(s) of code, or even generate the likely code. It also has the potential of spitting out new test cases with every code iteration, dramatically cutting down the time and effort to write and test code. In lay terms, AI for code functions like auto-complete or spell-check on a smartphone but goes even further by generating chunks of code that, otherwise, would have to be hand-written.

How enterprises can gain from AI for code

Interestingly, software development has always relied upon well-defined, repeatable, and predictable sequential moves. This must be aligned to end-user expectations, requiring careful GUI design and delivery. AI for code cuts down the effort needed for these repeatable tasks, freeing up developers and product designers to focus on application behavior and adoption. Specifically, the benefits of AI for code include:



Business Performance Enhancement

In a dynamic digital environment, it is easy to become fragmented, especially in the case of large, globally distributed enterprises. With different owners across multiple verticals, the application development process becomes widely disparate, frequently leading to substantial technical debt.

Using a singular AI platform across the enterprise, business leaders can ensure code consistency with minimal risk of human error. This also helps scale applications as per business demand and requirements to ensure that applications get smarter and constantly evolve to drive greater business benefits.



Time-to-market

The biggest benefit of leveraging AI for code is the acceleration of time-to-market. On a very rudimentary level, developers no longer need to physically type out the multiple coding components involved in building a complex application. Further, AI can learn from and predict coding structures across sizable application chunks, reducing the time taken for development.

Finally, the use of AI in application testing shrinks what is still a protracted yet vital part of development. All of this together speeds up release timelines, shortening time-to-value for both internal and customer-facing applications



Addressing skill gaps

The skills gap among technical talent is increasingly getting worse. In 2017, there were less than 50,000 computer science graduates in the US, but over 500,000 open technical job roles. By 2020, the number of unfilled programming-related jobs in the US will cross the one million mark. And this is compounded by growing demands in areas like cloud computing, data science, UX design, mobile app development, and other highly skilled domains.

AI-assisted code development can go a long way in addressing this scarcity by equipping even beginners with the necessary tools for full-fledged application development. Further, AI will continually learn from veteran programmers using the platform, becoming incrementally better and more capable.



Quality assurance and reduced cost

Traditional models of application development hinge on the individual developer's expertise levels. Without adequate knowledge or expert assistance, applications are likely to falter in terms of scalability, performance, and security. AI applies these as default parameters when spitting out code snippets and auto-completed segments.

As a result, code quality will witness a major uptick, regardless of the developer assigned. Even when the enterprise undergoes a fresh hiring cycle or mergers/acquisitions with critical applications changing hands, code quality will remain consistent.

Adoption possibilities and market overview

While AI is frequently associated with futuristic technologies and experimental projects, AI for code has fast exited the hype stage. The technologies discussed here are well under-production, and AI-driven development was named among the **top 10 strategic technology trends for 2019 by Gartner**.

Investment in this space is also rising. Rapid application development (of which AI-led low code development is a part) comprises a sizeable market today. **RAD software was worth US \$7.8 billion in 2018 and is expected to cross US \$46 billion by 2023**, growing at an incredible pace of 42.9% CAGR. Needless to say, this surpasses the growth rate being witnessed by most technology sectors in action today.

Innovators across the globe, from giants such as Microsoft to disruptive startups have made significant strides in AI for code. They are proactively turning the exciting promise of AI into implementable reality. Here are a few highlights:

Kite's on-premises auto-completion tool for Python

Kite is a coding assistant that leverages the power of ML to suggest code completion in Python and related languages. Not only does the platform bring built-in knowledge of the entire Python library, it intelligently extracts data from the existing codebase, to spit out recommendations. These range from a full line of code to entire function calls ranked by relevance to the developer.

1

Kite can help reduce the number of keystrokes by 47% and generate documentation in one click. This proves extremely useful for rapid application development, simplifying audits (thanks to one-click documentation) and shrinking time-to-market (owing to a dramatic reduction in keystrokes).

Diffblue's unit test generation platform for Java

Diffblue helps to address the extensive time and effort involved in unit test creation for Java-based applications. It is leveraged by some of the leading organizations in the world, including Goldman Sachs. Goldman Sachs was able to save over a year in manual effort by leveraging Diffblue's AI for code capabilities. It also helped achieve greater cloud readiness and agility for new code development.

2

Diffblue is available for both on-premises and cloud deployment and is, built on AWS, Google Cloud, or Azure platforms. Businesses can gain more confidence around their applications, by ensuring there are unit tests even for edge cases and error paths that are frequently missed in manual development. One of its key benefits is risk mitigation from code change and compliance to security protocols.

IntelliCode's AI-assisted development for C#

IntelliCode was originally designed for use within the Microsoft Visual Studio, but given its immense popularity in the last two years, IntelliCode is now available as a standalone AI for code platform. In addition to C#, it is compatible with Python, Java, and a host of other languages.

3

Developers can reduce error frequency when writing code and even find issues faster while refactoring. This is because IntelliCode applies AI to obtain semantic awareness of the code structure. Microsoft's acquisition of GitHub has helped the company mine coding best practices from some of the most talented developers across the world. Businesses leveraging IntelliCode can be equipped to optimize coding in a variety of languages and tech-environments, paving the way for scalability.

CAST's application intelligence platform

What started with application health optimization has rapidly expanded to cover security, performance, size, and error rates. CAST uses AI to create an easy-to-understand blueprint of multi-tiered, multi-technology application interfaces.

Business leaders can compare their application's health against industry peers, and monitor the security measures in place. There is also a developer-facing dashboard to detect vulnerabilities before they can lead to an outage or breach. CAST is an end-to-end platform for enterprises looking to discover the full potential of AI in software engineering and delivery, adding value at every stage. At Zensar, we are committed to helping enterprises take advantage of the latest innovations in application development, and re-envision their business as an "application organization". This, we believe, is critical to standing out in today's digital economy.

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That is why we have partnered with Kite, Diffblue, IntelliCode and CAST, in addition to technology giants such as Google and Microsoft. This helps us offer a unique, AI-driven "Smart Application development and Maintenance solution Using Robotics, Automation, and Intelligence (SAMURAI)".

Partnering towards a Smarter Application Development Practice

As organizations relook at their application capabilities from an AI-driven perspective, it is vital to stay cognizant of the waves of transformation sweeping over the digital landscape. The Internet of Things (IoT), cloud computing, Blockchain, and data analytics are changing user expectations. It is vital to shrink release cycles to meet these expectations. AI will prove to be a compelling solution, cutting down coding efforts while improving accuracy, scalability, and security.

For more information about Application Development and Maintenance, please contact:

Sanjay Suryadevra

VP and Global Head - Application Development and Maintenance |

sanjay.suryadevra@zensar.com

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