

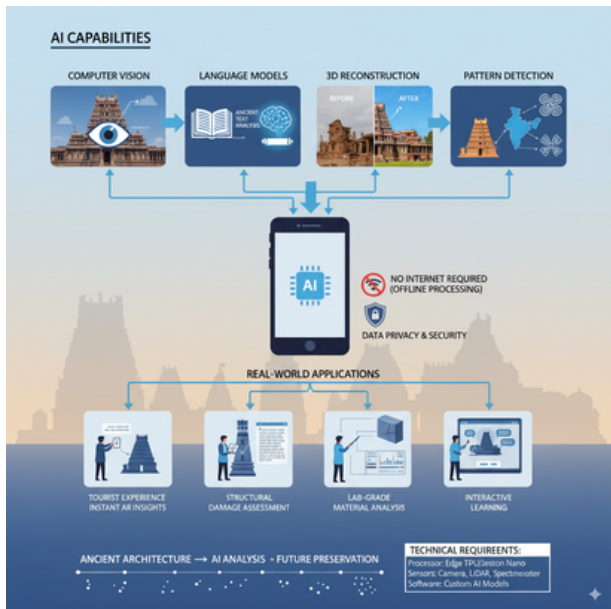
Edge AI for Heritage: Exploring Temple Architecture in the Digital Age

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Indian temple architecture showcases extraordinary structures that blend regional history, philosophy, and craftsmanship into timeless masterpieces. These monuments hold secrets that have puzzled historians and archaeologists for generations. The intricate carvings at Rani ki Vav and Khajuraho display precision rivaling modern machinery, while temples follow sophisticated fractal principles where small architectural elements repeat and scale up to create entire structures—a design system creating harmony from the smallest motif to the grandest spire. These architectural patterns recur across vast geographical regions, demonstrating extensive cultural exchange between ancient civilizations.

Artificial intelligence is revolutionizing how we understand temple architecture. Computer vision models analyze photographs and video streams to identify architectural styles—distinguishing between towering Dravidian gopurams and curved Nagara shikhars—while estimating construction periods by recognizing dynastic design patterns. Large Language Models process vast amounts of traditional texts like Manasara, Vastushastra, archaeological reports, and architectural documentation to reveal construction techniques, symbolic meanings, and cultural significance.

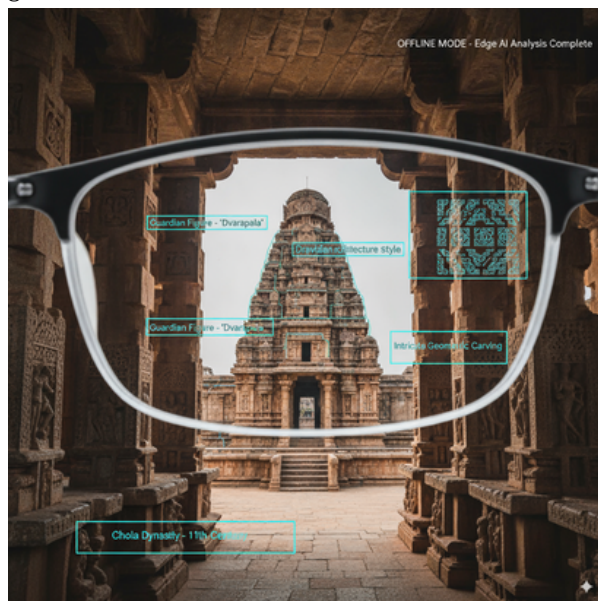


Most remarkably, 3D generative models digitally reconstruct damaged temple sections using surviving elements, architectural principles, and historical records. This technology helps visualize temples in their original glory—complete with vibrant paint schemes, missing decorative elements, and structural wholeness based on traditional design systems. AI excels at detecting hidden connections invisible to human observers, tracing how architectural ideas, religious concepts, and artistic techniques traveled across India.

The fundamental challenge: Most heritage sites are located in remote areas with limited or no internet connectivity. The caves of Ajanta, stepwells hidden in Gujarat villages, and mountain temples in Himachal Pradesh often lack reliable network access. Cloud-based AI systems become ineffective where immediate analysis is most crucial. Edge AI solves this critical limitation by running sophisticated algorithms directly on portable devices—smartphones, tablets, or specialized hardware like Jetson devices for intensive processing requirements.



Edge AI transforms heritage preservation by bringing advanced architectural analysis directly to smartphones and tablets. This schematic illustrates the complete workflow from AI capabilities to real-world applications, enabling offline cultural insights at remote temple sites across India (Illustration : AI generated).



Edge AI ensures immediate analysis without internet dependency, maintains privacy by keeping cultural data local rather than transmitting to distant servers, and provides cost-effective deployment across India's thousands of heritage sites. This approach eliminates bandwidth limitations and enables real-time decision-making for conservation efforts.

From tourists to conservators, Edge AI unlocks temple secrets on-site — analyzing, preserving, and sharing heritage without relying on the cloud (Illustration : AI generated).

Building on these advantages, multiple user groups directly benefit from this technology. Tourists use smartphone apps to point cameras at temples and instantly learn their history—visitors at Konark Sun Temple can discover the astronomical significance of wheel carvings through AR overlays. Conservators carry tablets that detect structural damage, generate detailed reports, and recommend restoration approaches on-site without connectivity delays. Researchers deploy portable computing devices for pattern recognition and, when connected to spectrometers, analyze building materials and construction.

Edge AI makes architectural expertise accessible to everyone with a smartphone. This portable technology ensures India's temple secrets are decoded, preserved and understood for future generations, enabling smart monitoring

of monuments, instant damage alerts, and restoration guidance that maintains historical accuracy while ensuring safety.

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