

Dropbox Policy Research and AI Integration



Dropbox x Ascend Consulting



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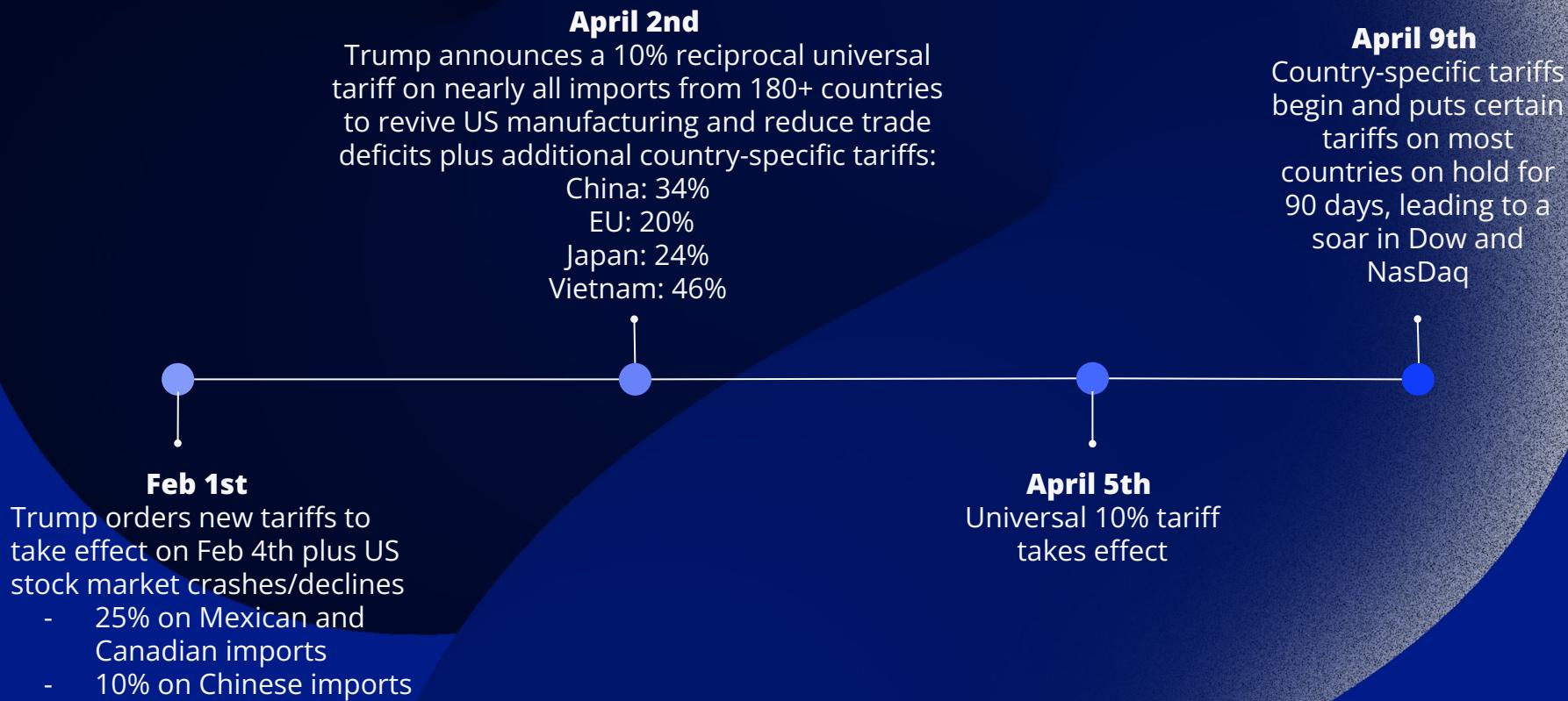
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01

Government Regulations, Tariffs, & Macroeconomic Impact

Trump Tariffs: 2025 Timeline



Impact of Tariffs on Dropbox



Data/Server Centers

Data center building costs will rise. Although semiconductors are exempt from tariffs, the circuit board assemblies they are sold with aren't, so they will be affected by the Taiwan tariffs.

GPUs and Motherboards

ASRock, Taiwanese motherboard and GPU vendor, is responding to Trump's tariffs by shifting manufacturing to other markets, which will enable ASRock to **avoid the 10% tariff and future levies**. ASRock plans to work with **Vietnam and Taiwan**, and may need to absorb some of the cost and increase some prices to reflect the increased cost.

Solid State Drives

To avoid country-specific tariffs when shipping SSDs to the US, makers of SSDs will have to **assemble them in countries that aren't subject to import duties**, or will have to build them in the US. Unlike HDDs, SSD producers can change the origin of their products relatively easy.

Hard Disk Drives

Companies like Seagate, Toshiba, and Western Digital have different supply chains but their setups are subject to risks of substantial US import tariffs. Seagate and WD will likely increase their operations in the US to prove that there is **20% of American content in their drives to cut down duties**.

Semiconductor Tariff Exemption



US Chip Firms Outsourcing Manufacturing Exempted from China's Tariffs Against the US

On April 11th, it was announced that the chips purchased by Chinese firms from American companies like Nvidia (which outsources manufacturing to TSMC in Taiwan), **would not be subject to China's tariffs on US goods**. However, American companies that manufacture domestically like Texas Instruments/Intel would **still see China's tariffs apply to those chips** made in the US.



Semiconductors are Officially Exempt from New Reciprocal Import Tariffs

Trump administration clarified that **semiconductors are officially exempt from new reciprocal import tariffs**. This includes dozens of products under the **HTSUS** — covering integrated circuits, memory storage devices, processors, and specialized computing components.



02

Supply Chain Trends & Supplier Segmentation

Key Players in Motherboards



MSI

MSI products are known for their high quality and durability, gaming-oriented products that include high-performance components, advanced cooling systems, customizable RGB lighting, and aesthetics.

- Market Cap: 144.89B
- Stock Price: 171.5
- Market Share: 19% (2016)
- Products: Manufacture personal PC parts like GPUs, motherboards, PC cases, and other PC components, laptops, peripherals like keyboards and mice, monitors, graphic cards, desktops



GigaByte

Gigabyte's motherboards are known for their build quality, reliability, and features like advanced cooling solutions, robust power delivery systems, and user-friendly BIOS interfaces.

- Market Cap: 178.86B
- Stock Price: 267
- Market Share: 14.1%
- Products: Manufacture personal PC parts like GPUs, motherboards, PC cases, and other PC components, graphic cards, laptops



Asus

Asus' high-end products have exceptional build quality, excellent performance, and unique designs, like a second capacitive display and customizable knob. Asus is popular in the gaming world, the company is a regular sponsor of esports events and why players.

- Market Cap: 144.89B
- Stock Price: 171.5
- Market Share: 19% (2016)
- Products: Manufacture personal PC parts like GPUs, motherboards, PC cases, and other PC components, monitors, laptops, desktops, graphic cards, and more



MSI SWOT Analysis



STRENGTHS

- **Powerful Hardware:** MSI's products dominate the industry in terms of performance, cutting-edge graphics cards and powerful hardware configurations with innovative power upgrades
- **High Refresh Rate Screens:** features varying refresh rates and screen sizes, with silky-smooth frame rates, fast response times, and enhanced gameplay
- **Stepping Up Innovation:** MSI is spearheading gaming laptops by keeping its frame/border super thin while maintaining webcam's sacred placement.

OPPORTUNITIES

- **More Budget Friendly Products:** MSI has released a vast array of AM5 motherboards featuring the B850 chipset and while these options are great themselves, the company is prepping even more options for budget builders.
- **Unstoppable Performance:** MSI is releasing an upcoming AMD Ryzen 9950X3D and 99003D processor, built on the Zen 5 architecture. It features AMD's cutting-edge 2nd generation AMD 3D V-Cache technology, and is designed to increase cache size, allowing faster data access and improved performance.



WEAKNESSES

- **Limited Support:** customer service is only available during business hours, has long wait times as well
- **Bulky Designs:** Laptops are less portable to carry than other laptops with their bulky designs, need additional hardware components like cooling fans, increased FAM, dedicated graphics cards to improve performance
- **High Prices:** Laptops come with expensive price tags due to powerful hardware configurations and gaming-centric features

THREATS

- **Inability to Cope with Technological Advancements:** The tech industry is so fast paced that MSI can lose its competitive edge and can slow down adoption or delay of products, or even lack compatibility with emerging technologies like AI or ML.
- **Competition:** There are different latest products from other companies, brands, and competitors that are selling the same types of products

Key Players of Hard Drive Sector



Toshiba

Toshiba's hard drive is known for their performance, delivering a fast 7200 RPM speed and large cache size that helps shorten response time.

- Market Cap: 139.79B
- Stock Price: Private company purchased by Japan Industrial Partners
- Market Share: 10.5%
- Products: air conditioners, consumer electronics, control systems, TVs, laptops, storage devices, HDDs, recorders, printers, copiers.



Western Digital

Western Digital's My Passport Ultra has the largest capacity available among portable drives, one of the most affordable drives with a lot of storage capacity, works with Windows computers and Macs

- Market Cap: 15.39B
- Stock Price: 44.51
- Market Share: 27.36%
- Products: data storage services and solutions, hard disk drives (HDDs), solid-state drives (SSDs) for different applications



SeaGate

SeaGate's hard drive is one of the least expensive drives per terabyte and is consistently faster than most of their competition, and they're able to manufacture high-capacity HDDs.

- Market Cap: 17.58B
- Stock Price: 83.04
- Market Share: 14.15%
- Products: hard drives, SSDs, surveillance storage, NAS drives, enterprise systems, cloud solutions



Western Digital SWOT Analysis



STRENGTHS

- Research and development:** The company's commitment to innovation is evident in its substantial investment in R&D, fueling development of cutting edge storage technologies. WD has 13,000 active patents, focusing on continuous innovation and tech advancements.
- Strategic Business Separation:** WD separated Flash and HDD business units to optimize company's operations. Creating two independent public companies allows WD to capitalize on unique growth, extend leadership positions, and achieve efficient capital structure.

OPPORTUNITIES

- Market Demand for Data Storage:** The global demand for data storage continues to grow, driven by the proliferation of digital content, cloud computing, and advancements in AI and IoT. WD's broad portfolio of HDD and SSD products position them to capitalize on this trend, meeting storage needs of enterprises.
- Technological Advancements:** WD's focus on developing innovative storage solutions (high-capacity enterprise HDDs and high-performance SSDs) presents opportunities for growth in various market segments. WD's ongoing R&D efforts are likely to yield new products that address emerging storage requirements.

WEAKNESSES

- Financial Performance:** Recent financial performance for WD has been concerning with net loss of \$798M in 2024, compared to net income of \$1,546M in 2022. The company's gross profit margin also decreased from 31.3% in 2022 to 22.6% in 2024. This decline in profitability shows challenges faced by WD due to decreased unit shipments and pricing.
- High Operating Expenses:** WD's operating expenses remain high, totaling \$3,262M or 25.1% of net revenue, from costs associated with research and development, selling, general and administrative expenses, and litigation matters.



THREATS

- Competitive Industry Landscape:** WD operates in a highly competitive industry, facing strong competition from other HDD manufacturers. Companies like Seagate, Toshiba, Kioxia, and Micron Technology pose constant threats to WD's market share and profitability.
- Global Economic Conditions:** WD's international operations expose it to risks associated with global economic conditions, volatility in financial markets, trade restrictions, and geopolitical tensions, impacting demand for products, supply chain and manufacturing operations.

Key Players in Server Space Sector



AWS

Frequently praised for its extensive service offerings, robust global infrastructure, and pioneering role in the cloud industry with their innovative features that can benefit cloud operations, their user-friendly platform design, and how affordable it is.

- Market Cap: 2.02T
- Stock Price: 190.26
- Market Share: 30%
- Products: cloud computing



Google Cloud

Stands out for their easier, more modern interfaces and their stronger security control

- Market Cap: 1.9T
- Stock Price: 156.23
- Market Share: 90.15%
- Products: Drive, sheets, calendar, security camera, speaker, Google Suite



Microsoft Azure

Known for its business sustainability with its rapid reaction time and short development cycles, along with their higher availability.

- Market Cap: 2.79B
- Stock Price: 375.39
- Market Share: 4.7% of global PC market
- Products: Microsoft Suite



AWS SWOT Analysis



STRENGTHS

- Comprehensive service offerings:** AWS has an extensive and continually expanding portfolio of services, catering to many customer needs, attracts diverse customers
- Global infrastructure:** AWS has a vast network of data centers across multiple regions and availability zones worldwide, provide worldwide low-latency access, and high availability
- Cost-effectiveness:** AWS follows a pay-as-you-go pricing model, allowing customers to pay only for resources they use, helping businesses optimize their IT costs.

WEAKNESSES

- Pricing:** With AWS's pay-as-you-go pricing model, pricing structure can be complicated with many factors affecting overall cost, making it hard to predict and challenging to manage their cloud expenses, leading to unexpected costs.
- Limited customer support:** AWS's basic customer support is considered limited, with users requiring higher levels of support, resulting in dissatisfaction of customers.
- Competition:** AWS faces competition from other major cloud service providers (Microsoft Azure or Google Cloud)

OPPORTUNITIES

- Growing cloud adoption:** As more companies embrace cloud computing for their IT infrastructure, AWS can leverage its market leadership and comprehensive services to attract new customers.
- Expansion into emerging markets:** AWS can tap into the growth potential of emerging markets such as Africa, Latin America, and Southeast Asia and tailor offerings to meet regional demands.
- Vertical-specific solutions:** Develop industry-specific solutions catering to unique requirements of sectors (healthcare, finance, retail, and manufacturing). These tailored solutions can help AWS attract customers from these industries and deepen penetration.



THREATS

- Market saturation:** As the cloud computing market matures, growth rates may slow down, making it challenging for AWS to maintain its current pace of growth.
- Vendor Lock-In Concerns:** As customers become more concerned about vendor lock-in, they may seek alternative solutions or multi-cloud strategies that allow them to avoid overdependence on a single provider, potentially reducing AWS market share.

Key Players in GPUs



Nvidia

Nvidia combines its chips with a suite of accompanying software that programmers simply prefer, its supply chain allows it to produce GPUs in larger volumes, faster, and more reliable than its rivals. The Nvidia ecosystem from its software to its sourcing of materials allowed it to position itself as the go-to source for companies that need massive computing power to handle their AI needs

- Market Cap: 2.64T
- Stock Price: 108.38
- Market Share: 92%
- Products: GPUs



AMD

AMD systems are engineered for high-performance gaming and are paired with high refresh, low-latency premium displays and proprietary AMD Smart technologies that unlock unmatched gaming experience, their GPUs have incredible performance and efficiency

- Market Cap: 166.49B
- Stock Price: 102.74
- Market Share: 28.7%
- Products: processors, graphic cards, server accelerators, embedded processors



Intel Corp.

Intel's GPUs show promising performance with reasonable pricing, allowing for high quality visuals

- Market Cap: 99.03B
- Stock Price: 22.71
- Market Share: 75.4%
- Products: Processors, graphics, personal computers, data centers, AI, autonomous vehicles



Nvidia SWOT Analysis



STRENGTHS

- Dominance in Market:** Widely recognized as a pioneer and leader in GPU market, its product lineup is renowned for pushing boundaries of graphic performance & computational capabilities.
- High Brand Equity:** Their commitment to performance-oriented solutions ensure customer loyalty, facilitates easier market penetration for new product launches and helps maintain competitive advantage in rapidly evolving tech landscape.
- Strong Strategic Partnerships:** Forged strong partnerships with leading companies in various ecosystems to enhance its market capabilities (Microsoft, AWS, Tesla).

WEAKNESSES

- Supply Chain Vulnerabilities:** Nvidia depends on a limited number of foundries (TSMC) to manufacture its chips can be seen as critical weakness. Reliance on external suppliers exposes company to various risks
- High Product Prices:** Nvidia's products are often positioned as premium offerings, resulting in a perception of high pricing among consumers/businesses.
- Heavy Dependency on PC Gaming:** Nvidia's reputation is heavily linked to the PC gaming industry, it's subject to fluctuations based on consumer sentiment.

OPPORTUNITIES

- Expansion into AI and ML markets:** The rise of AI and ML presents an opportunity for Nvidia, company's expertise in GPU aligns perfectly with requirements of AI processing
- Growth in Cloud Gaming and VR:** Cloud gaming and VR markets still need to be explored, these sectors are projected to grow exponentially, Nvidia is positioned to capitalize on this trend through its GeForce NOW platform.
- Driving Development in Data Centers:** As businesses shift toward cloud services, data centers expand in size and complexity, creating a demand for high-performance computing.

S W
O T

THREATS

- Supply Chain Vulnerabilities:** Nvidia's reliance on complex global supply chain to manufacture chips expose company to vulnerabilities. Sourcing raw materials (silicon, metals) is challenging, can face production delays that impacts client deliverables, affecting revenue and customer loyalty.
- Escalating Competition:** Nvidia faces intense competition like AMD and Intel, emerging players in the GPU and AI sector. With rapid advancements in AI technologies, numerous startups and smaller firms are developing specialized hardware designed to optimize ML applications.

Key Trends Reshaping the Tech Supply Chain



Neoshoring & Localization

- Companies are **relocating manufacturing** to nearby regions like **Mexico, Vietnam, and Taiwan** to **mitigate geopolitical risk** and **tariff impacts**.
- U.S. legislation (e.g., **CHIPS Act, IRA**) is incentivizing **domestic** chip and EV component production.
- Dropbox is **re-evaluating its supplier base** to **reduce over reliance on China**.

Digitalization & Real-Time Visibility

- Increasing adoption of **RFID, Bluetooth, and GPS tracking** for live inventory updates and shipment transparency.
- Improves resilience by enabling **faster responses** to disruptions, enhances supplier accountability, **monitors delays**.

Hybrid & Multi-Cloud Supply Chain Resilience

- Companies (e.g., Netflix, Spotify) adopt **hybrid or multi-cloud systems to maintain operational continuity**.
- Cloud strategy helps **manage infrastructure demands** when physical supply chains are strained.

AI & Automation in Supply Chain Operations

- Leaders like Amazon, Walmart, and IBM deploy AI for **demand forecasting, inventory optimization, and robotic automation in fulfillment operations**.
- Dropbox has initiated scenario planning and resource allocation modeling, but can further adopt predictive analytics to enhance supply chain decisions.



03

Competitor Analysis

Competitors

Amazon



Walmart



IBM





Implementation

Amazon introduced **Project P.I.**, which is an AI-powered quality control system that uses **computer vision to photograph** each product, **detect damages, color mismatches, sizing issues** before shipment.

The company uses the **Sequoia robotic system** which **organizes products in optimal storage locations** based on real-time demand forecasting, significantly **improving warehouse efficiency**.

Through **AWS infrastructure**, Amazon supports large-scale **training** and **deployment** of AI and ML models, enabling **real-time adjustments** across its supply chain operations.

Impact

Project P.I. has led to significant **reduction in product returns** by identifying defective items before they reach customers, enhancing overall satisfaction.

The Sequoia system has improved **sorting speeds** by up to **75%**, accelerating order fulfilment and **minimizing human error**.

AWS's scalability allows Amazon to handle peak demand seasons efficiently without major infrastructure investments, **optimizing both cost and performance**.



Walmart

Implementation

Walmart has invested over **\$520 million in robotics** for its fulfillment centers, enabling safer, faster, and more accurate sorting, packing, and shipping processes.

AI-driven forecasting tools help **predict shifts in customer demand**, allowing Walmart to make informed decisions on inventory and procurement.

Real-time inventory tracking, powered by internal **AI systems** and **barcode technology**, ensures **accurate monitoring of products** throughout the warehouse.

Impact

These investments have led to a noticeable **decrease in fulfillment errors**, improving **order accuracy** and **reducing operational bottlenecks**.

Enhanced forecasting capabilities have allowed Walmart to offer **faster delivery** options, including **two-day shipping**, while keeping inventory in check.

The use of robotics and AI has contributed to **higher profit margins on e-commerce orders** by **reducing labor costs** and **improving inventory turnover**.



Implementation

IBM's **Sterling Supply Chain Intelligence Suite** integrates generative AI tools to **automate tasks** such as **reordering** and **disruption forecasting**, enhancing decision-making across supply chains.

Advanced AI-based tracking tools provide **end-to-end visibility into inventory, logistics, and supplier interactions**, allowing for proactive issue resolution.

IBM's systems are designed for **seamless integration with major ERP platforms like SAP and Oracle**, minimizing the friction involved in digital transformation.

Impact

IBM's AI systems provide **real-time visibility into global supply chains**, helping businesses anticipate and mitigate potential disruptions before they escalate.

Automation of routine tasks has significantly **reduced manual workloads**, allowing teams to focus on strategic and high-value decisions.

IBM's platforms also support **carbon tracking** and **ESG compliance efforts**, aligning supply chain operations with **sustainability goals**.



04

Current Dropbox Challenges & Efforts



Dropbox: Challenges & Strategic Responses



Challenges

Hardware Shortages & Logistics Disruptions

Dropbox faced hardware delays due to reliance on Chinese suppliers, compounded by global shipping bottlenecks.

Remote Work Demand Surge

A 40% surge in usage from remote work put unexpected strain on Dropbox's infrastructure and supply chain.

Limited Supplier Diversity

Concentration in specific regions left Dropbox vulnerable to factory shutdowns and workforce disruptions.



Strategic Responses

Supplier Engagement

Increased communication and visibility into deeper tiers of the supply chain.

Cloud Migration

Temporarily moved services to public cloud to manage demand and stabilize forecasts.

Skeleton Crew Model

Rotated on-site staff to keep data centers running safely during disruptions.



Future Recommendations

Digitalization for Visibility

Implement RFID, GPS, and Bluetooth to track inventory in real time.

Flexible Supplier Contracts

Build in adjustable terms for volume, price, and timing.

Diversify the Supply Base

Reduce regional risk by expanding global sourcing.



05

AI Integration Solutions & Demos

Key Players in Motherboards

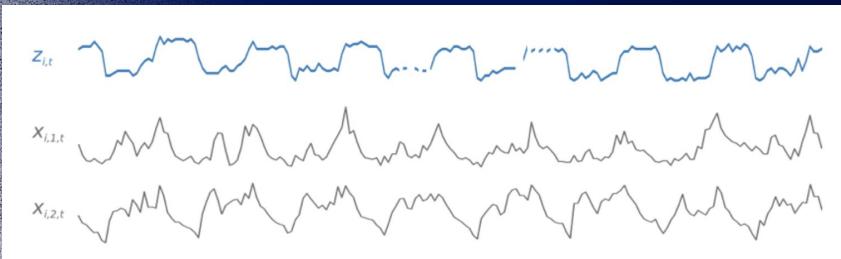
Time-Series Forecasting Meets Spatial Data Analysis



DeepAR+

- **Time-Series Forecasting:** Predicts future trends based on historical data using RNNs
- **Multi-Series Learning:** Groups related time-series data into buckets to improve accuracy across diverse datasets
- **Context Length and Forecast Horizon:** Analyzes past data (e.g., 30 days) and predicts future outcomes (e.g., next 14 days)
- **Handles Uncertainty:** Accounts for factors like seasonality, holidays, weather, and promotions to provide robust forecasts
- **Applications in Supply Chain:** Optimizes inventory management and demand forecasting across multiple regions

Recurrent Neural Network-based algorithm



CNN-QR

- **Spatial Data Analysis:** Processes spatial patterns in data using convolutional layers
- **Feature Extraction:** Identifies key attributes in images or geographic data for decision-making
- **Versatility:** Adapted for tasks like route optimization or identifying delivery clusters
- **Robustness:** Handles variations in spatial attributes effectively (e.g., object positioning or regional differences)
- **Applications in Supply Chain:** Enhances logistics planning and warehouse optimization through spatial insights

Convolutional Neural Network based algorithm



Deep Dive into DeepAR+: Revolutionizing Time-Series Forecasting



What is DeepAR+?

Overview

DeepAR+ is a **recurrent neural network** based forecasting model in Amazon SageMaker that learns from many related **time series** and provides **probabilistic future forecasts**

Input

DeepAR+ uses **historical time series data** ($Z_{i,t}$), along with known features like promotions or seasonality ($X_{i,1,t}$) and categorical variables ($U_{i,1,t}$) such as region or product type

Learning Data

It **groups related time series** and shares patterns using categorical embeddings, boosting **accuracy** for sparse or noisy data

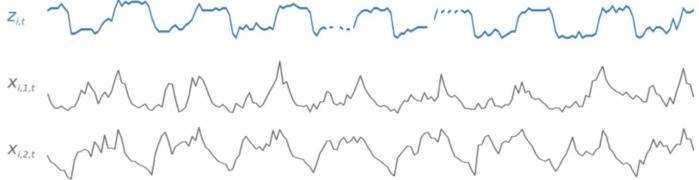
RNN Architecture

The model uses **past data** (context window) to learn temporal dependencies and outputs probabilistic forecasts for a future horizon (e.g., next 14 days)

Flexible Features

DeepAR+ supports **known future features** for “what-if” scenario testing, handling missing data, and adapting to complex patterns like holidays or usage spikes

DeepAR+ Algorithm



**Use 30 days data
Predict 14 days
Across 500+ time series**

The model uses past target values, known external features, and categorical identifiers to learn temporal patterns across multiple time series. The dotted line indicates the forecast horizon where future values are predicted

Deep Dive into CNN-QR: Quantile Regression & Convolutional Networks



What is CNN-QR?

Overview

CNN-QR is a time series forecasting algorithm in Amazon SageMaker that uses **convolutional neural networks** to produce quantile-based predictions, capturing uncertainty and distribution across time

Input

Takes **multiple time series** as input, along with static features and time-dependent known covariates (like promotions, holidays, events), and transforms them through temporal convolution layers

Learning Data

Learns patterns across many related time series by using sliding convolutional filters to capture local dependencies and trends—making it **highly scalable and efficient**

CNN Architecture

Instead of recurrence, CNN-QR uses dilated **causal convolutions**, which process all input time steps in parallel and learn from **recent history** without sequential dependencies

Quantile Output

Rather than predicting a single value, CNN-QR generates **quantile forecasts** (e.g., 10th, 50th, 90th percentiles), providing a full picture of **possible outcomes**

CNN-QR Algorithm



**Use 60 days data
Predict 14 days
Across 500+ time series
with uncertainty bounds**

Using 60 days of recent data, the model outputs multiple quantile forecasts for the next 14 days. Quantile regression provides a full distribution of possible future values, enabling risk-aware decisions

Forecasting Pipeline with DeepAR+ and CNN-QR

Overview of how DeepAR+ and CNN-QR function together to deliver accurate, risk-aware time series forecasting



Context Extraction

Initial Prediction

Local Refinement

Combined Output

Historical Context Extraction

DeepAR+ learns from historical data across many related time series to uncover global patterns like seasonality, trends, and promotions

- Recurrent Neural Networks
- 30–60 Days of Input History
- Time Series Embeddings
- Categorical & Known Covariates

Baseline Forecast Generation

DeepAR+ produces probabilistic forecasts (mean + confidence) across all series, serving as the primary signal for demand or usage predictions

- Predicts Next 14 Days
- Scalable to 500+ Series
- Handles Sparse & Noisy
- Data Ideal for Planning & Allocation

Uncertainty Modeling & Local Adjustment

CNN-QR uses recent temporal slices and static features to generate quantile forecasts, allowing fine-tuned uncertainty ranges

- Convolutional Neural Networks
- Quantile Regression
- Local Short-Term Variability
- Risk-Aware Decision Support

Integrated Forecasting Output

Combining DeepAR+ baseline with CNN-QR's quantile bands enables full-spectrum insight - from expected demand to best/worst-case scenarios

- Scenario Planning
- Forecast Confidence Bands
- Auto-scaling & Buffer Planning
- Real-World Deployment in Retail, SaaS, Logistics

Enhancing Dropbox's Supply Chain with Advanced AI Models

DeepAR+ and CNN-QR: Implementation Opportunities



DeepAR+ Application

- **Hardware Demand Forecasting:** Predict server needs across global data centers by analyzing historical procurement patterns and growth trends
- **Supplier Performance Modeling:** Group suppliers into "buckets" based on historical delivery times and quality metrics to improve partner selection
- **Inventory Optimization:** Account for seasonal data center growth and adjust stock levels to prevent over & understocking
- **Multi-Tier Supply Chain Visibility:** Analyze time-series data from tier-two and tier-three suppliers to predict potential disruptions

Implementation Benefits

- Improved Resilience
- Enhance Resource Allocation
- Enhance Forecast Accuracy
- Relationship Strengthening
- Cost Reduction
- Risk Management
- Customer Satisfaction
- Improved Supplier Collaboration



CNN-QR Application

- **Component Shortage Prediction:** Leverage CNN's pattern recognition to identify potential supply disruptions before they impact operations
- **Spatial-Temporal Analysis:** Optimize rack placement across datacenters based on geographical demand patterns and usage trends
- **Quality Control Enhancement:** Use image recognition capabilities to automate virtual quality inspections for remote operations
- **Derived Feature Analysis:** Automatically create and analyze time-based features (day-of-month, day-of-year) to detect cyclical hardware needs

Key Success Metrics

- 73% improvement in forecast accuracy compared to traditional methods
- Significant reduction in supply chain disruption impacts through proactive management
- More efficient virtual quality inspections and supplier collaborations



Google Vertex AI

AI integration service released on May 18, 2021.

What is Vertex AI?

Overview

Vertex is the official platform for Google's **AI integration services**. The platform offers usage of Gemini models from Google, capable of understanding input, combining information, and generating output.

Interpreting Input

Vertex reads data using programming such as **Cloud Storage**, **BigQuery**, or **APIs** and can **organize data** into categories, **create trendlines**, and **predict future datasets**. The more input provided, the more advanced the processing becomes.

Machine Learning Development

Google integrates **Gemini** into Vertex, making Vertex a well-developed AI model. In addition, **hundreds of brands** use Vertex furthering development. Vertex also includes **chatbots** and **document understandings** to make analysis easier.

Agent Builder

Vertex AI Agent Builder allows developers quickly build and deploy **generative AI agents** using a **no-code console**, with tools for grounding, orchestration, and customization based on their organization's data.

Model Garden

An array of models offered by Vertex that are **pre-built**, developed, and easy to implement. In addition, they are editable for users to build upon certain models that are found useful.



DeepMind

London-based AI startup acquired by Google on January 26, 2024



Benefits

- Allowed Google to **monetize AI capabilities** by selling AI services to users serving as the backbone for Vertex AI.
- DeepMind contributed to the development of **Google Gemini** which is Google's most prominent **AI chatbot** resource.
- DeepMind's AI **reduced data center cooling energy** by **40%**, optimized cloud resource allocation, and improved supply chain resilience through **real-time forecasting** and **reinforcement learning**.
- Acquisition of DeepMind strengthened Google's position amongst tech/AI giants such as Microsoft and Amazon.

Key Components

- DeepMind's AI uses **real-time data** from Google's data centers to **optimize** operations like **temperature** and **airflow**.
- The AI analyzes historical data to **predict energy needs** and **adjusts cooling** and power systems in real time to reduce waste.
- A **carbon-intelligent** computing platform shifts tasks to times and places with cleaner energy to lower carbon emissions.
- DeepMind aims to create **fully autonomous data centers** managed entirely by AI, though global scaling and coordination remain challenging.
- Google's Gemini chatbot **serves users** while **collecting aggregated data** to improve AI models, enhancing both services and backend systems.
- Google partners with companies like **Intersect Power** and **TPG Rise Climate** to build renewable energy facilities near data centers for efficient energy use.

Foundation



2001-2006

Core advertising and search capabilities
Applied Semantics Keyhole

Expansion



2006-2013

Media and platform extension (e.g. YouTube, DoubleClick, Android)

Diversification



2011-2019

Hardware and AI investments (e.g. Motorola, Nest, Deepmind)

Enterprise Cloud



2020-present

Cloud infrastructure and security (e.g. Mandiant, Wiz)

How Wayfair implemented Vertex AI into supply chain management

Before Vertex AI

Data scientists at Wayfair managed data from sources such as transactional data, delivery scans, etc. which was managed through multiple pipelines and was computationally expensive. This complexity was answered by Vertex AI.

Custom Training

Vertex **eases ML training processes** at large scales by reducing computing power and time. Vertex allows training with no need for managing servers. Additionally, Vertex offers numerous security features such as **VPC peering**, **VPC Service Controls**, etc.

Offline Experimenting

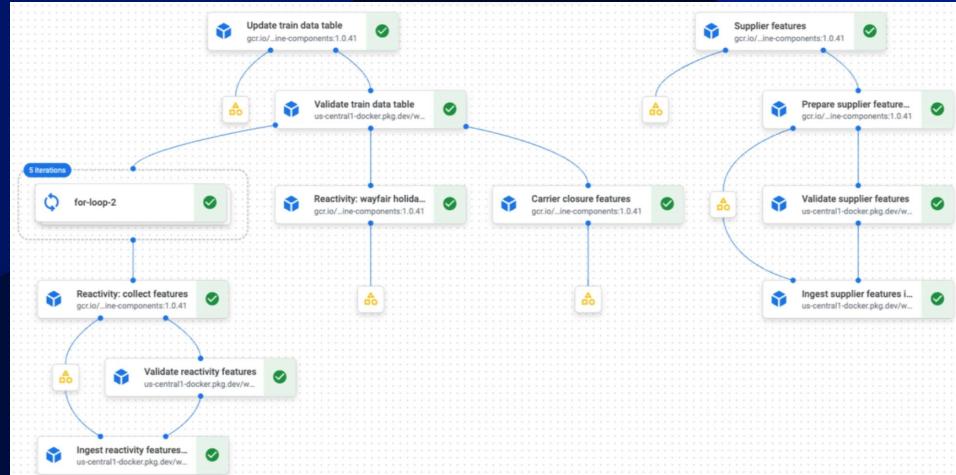
Wayfair used machine learning to **test experiments offline** in a digital fantasy rather than testing it in person. Using trends from observational patterns, AI can create a model where users can **input offline data** and **analyze results**.

Machine Learning Development

Vertex AI enables a smooth transition from development to production by using the same components in both environments, with the only addition being the deployment step to make the model accessible to live services. A **CI/CD system manages model and pipeline upgrades**, streamlining the release process for Wayfair.

Dependency

Vertex takes care over infrastructure and pipeline management for Wayfair, allowing Wayfair to focus on newer features or improved data collection. Google also manages troubleshooting in programming.



Wayfair Vertex AI pipeline

AI Integration Risks



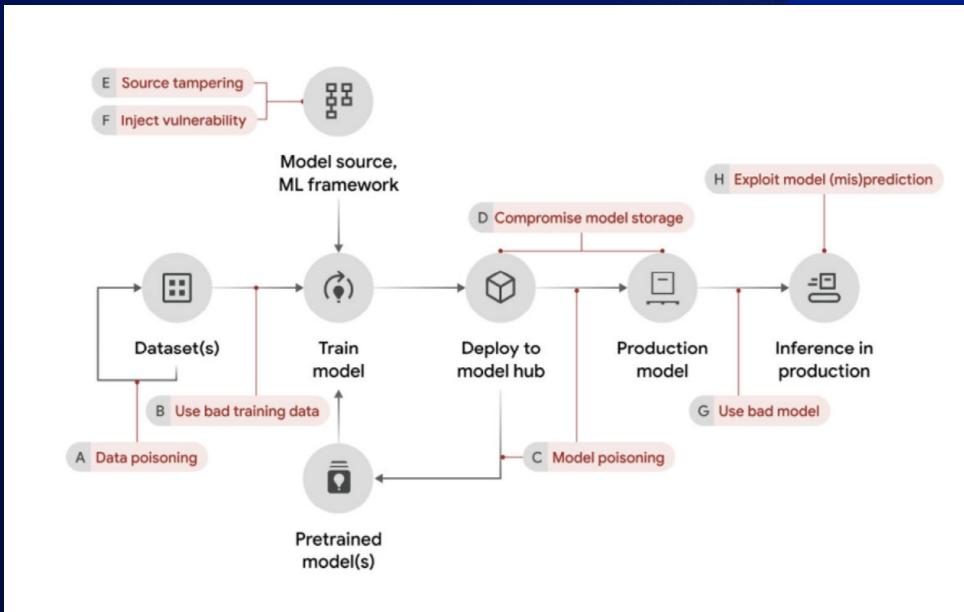
Platform Vulnerability

Integrating AI, especially through a third-party system could cause risks in cyber security or data leaks.

Data Integrity

Human error is not fully accounted for when implementing AI in supply chain management, which can lead to oversight or misjudgment in critical processes.

Data may be accidentally or maliciously altered during input, editing, or output, compromising the reliability of AI-driven decisions.



Model Drift & Over-dependence

Over-reliance on AI can lead to misinterpretation and reduced oversight, but validating inputs and results can help mitigate these risks.

Without regular updates, AI models lose accuracy over time due to shifting economic patterns, supply, demand, and tariffs.

Enhancing Dropbox's Supply Chain with Google Vertex

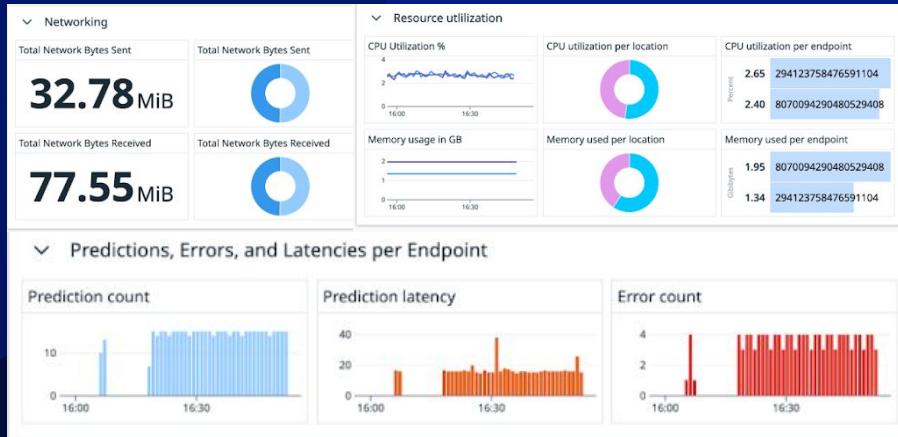


Vertex AI Features for Supply Chain

- TiDE uses a simplified **MLP architecture** for faster training and better predictions than traditional transformers.
- Vertex AI's AutoML enables easy model building, helping Google apply it to supply chain management without deep ML expertise.
- Google directly offers Vertex AI Forecast through Google Cloud, adding predictive tools that attract businesses and boost revenue.
- Vertex AI provides an easy-to-use **AI workbench** with **customizable templates** and **GPU settings**, simplifying ML model creation on Google Cloud.

Implementation Benefits

- **740 existing brands** use Vertex AI proving reliability, scalability, and a consistent developing model.
- **Offline and online storing** and modeling to train/experiment models.
- Google Cloud will allow the AI model to be mainly **ran on Google's data centers**, saving time, materials, and long term cost.
- Vertex AI enhances security and reliability through **centralized logging, transparent operations, and streamlined tracking of data/algorithms**.
- Pre-built tools and templates available on Vertex such as **Model Garden** and **Agent Builder** enable quicker model training and deployment.



Easy Tracking of Metrics in Google Cloud

- Prediction count - rate of predictions per second
- Prediction latency - time spent computing each request
- Error count - rate of errors in model

Troubleshooting

Vertex AI exports metrics to **Cloud Monitoring** included in Google's service. Cloud Monitoring can also be used to create dashboards or configure alerts based on the metrics. For example, Dropbox can receive alerts if a model's prediction latency in Vertex AI gets too high. This interface makes troubleshooting or model development easier.



Thankyou!

Q&A



06

Appendix & Resources



Appendix

Consultant Research Documents:

Government Regulations, Tariffs, and Macroeconomic Impact

Integration and Impact of AI within Supply Chain Operations

Make vs. buy decisions among leading cloud companies, focusing on the strategic considerations behind hybrid and multi-cloud models

Supply Chain Software Components

Supply Chain and AI Trends

AI integration within supply chain strategies

AI integration in supply chain management

In depth AI research- Amazon and Deepmind

In depth AI research - DeepAR+ & CNN- QR

In-depth AI research on Google's Supply Chain



Appendix

External Sources:

- <https://www.reuters.com/technology/trump-tariffs-could-stymie-big-techs-us-data-center-spending-spree-2025-04-03/>
- <https://www.pcmag.com/news/asrock-to-shift-manufacturing-in-response-to-trumps-china-tariffs>
- <https://www.mordorintelligence.com/industry-reports/motherboard-market/companies>
- <https://drivesaversdatarecovery.com/hard-drive-manufacturers-who-makes-hard-drives/>
- <https://www.mordorintelligence.com/industry-reports/graphics-processing-unit-market/companies>
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- <https://www.reuters.com/technology/trump-tariffs-could-stymie-big-techs-us-data-center-spending-spree-2025-04-03/>
- <https://www.tomshardware.com/tech-industry/trump-enacts-tariff-exemptions-for-computers-smartphones-and-more>
- <https://www.tomshardware.com/pc-components/storage/u-s-tariffs-to-heavily-impact-hdd-and-ssd-manufacturers-increasing-costs>
- <https://cloud.google.com/solutions/supply-chain-logistics#transform-your-supply-chain-and-logistics-operations-with-google-cloud>
- <https://www.cnbc.com/2025/04/09/google-will-let-companies-run-gemini-models-in-their-own-data-centers.html>
- <https://cloud.google.com/vertex-ai>
- <https://storage.googleapis.com/gweb-research2023-media/pubtools/7769.pdf>
- <https://finance.yahoo.com/news/decoding-western-digital-corp-wdc-050419881.html>

Icon pack



Project roadmap

Project timeline



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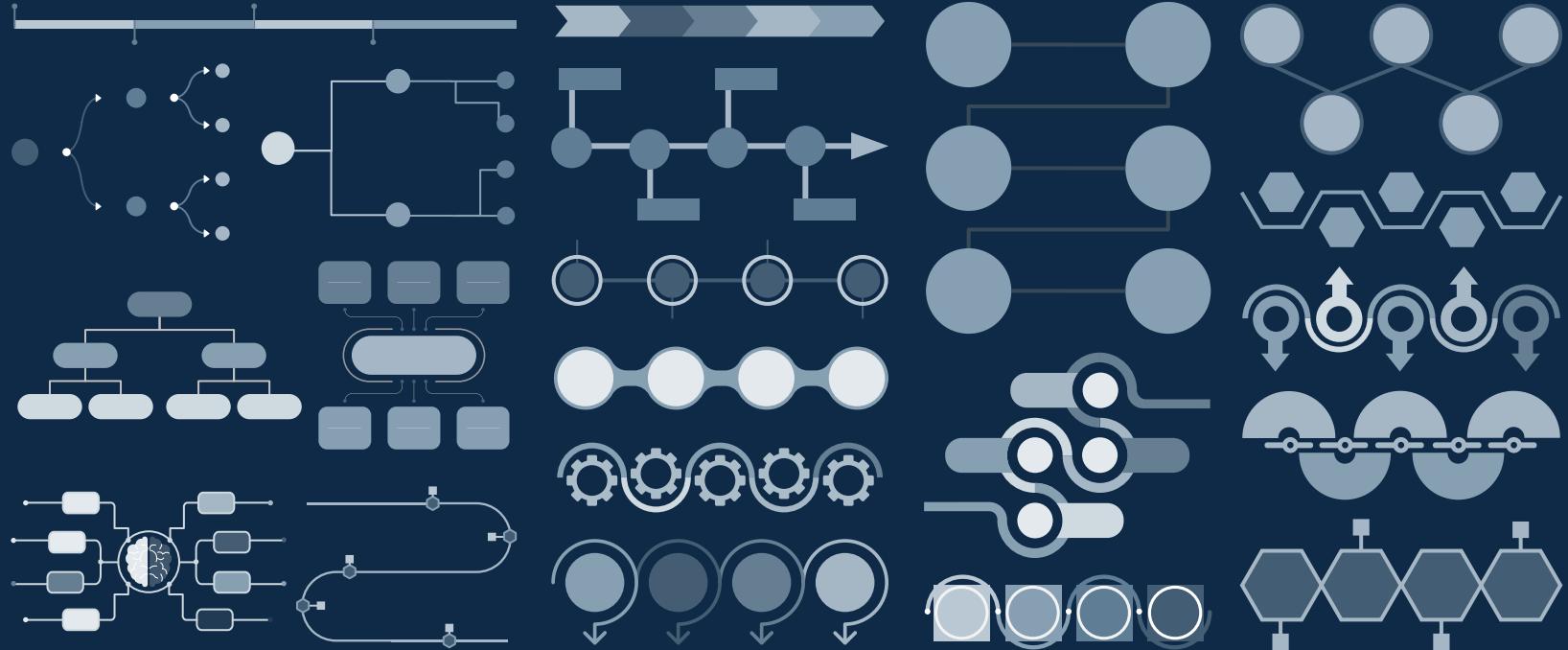
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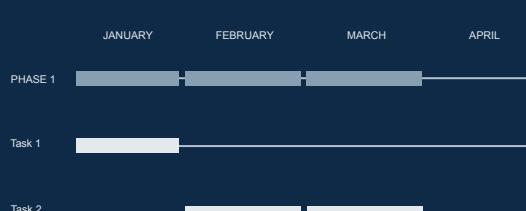
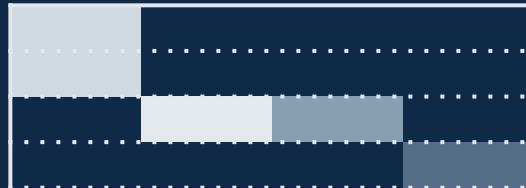
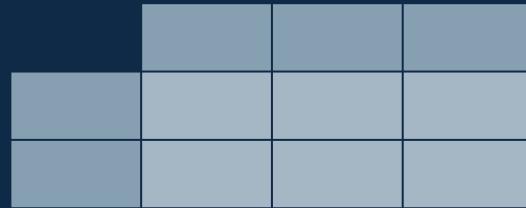
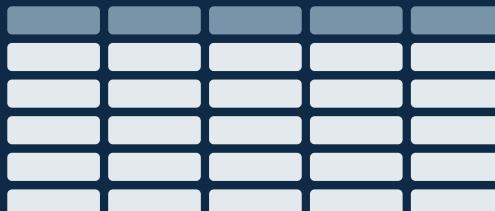
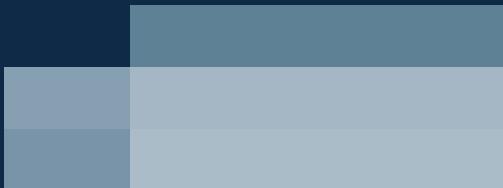
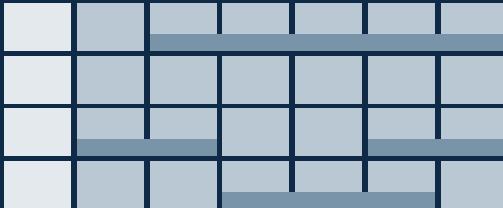
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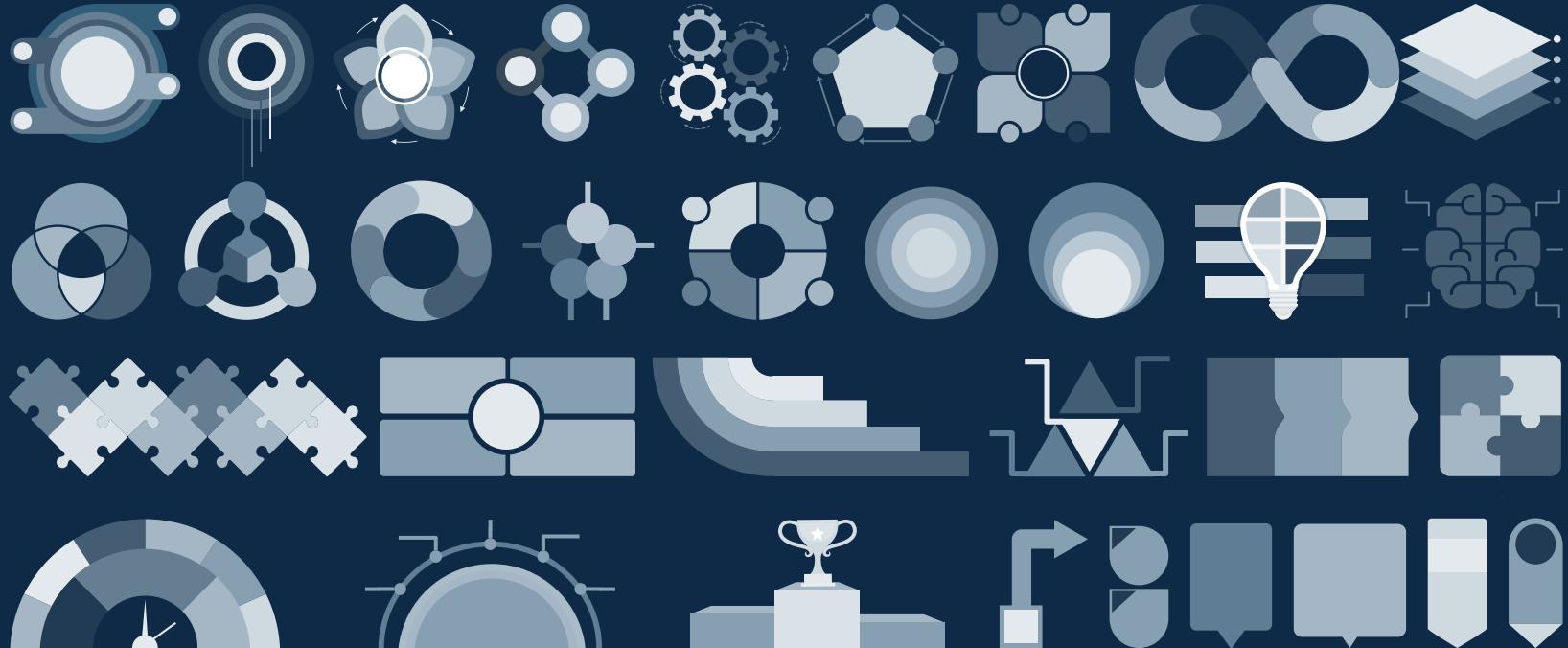
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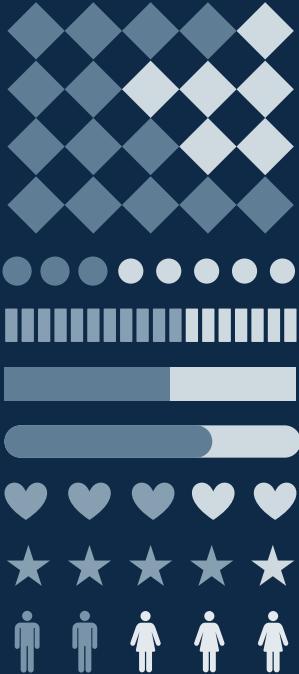
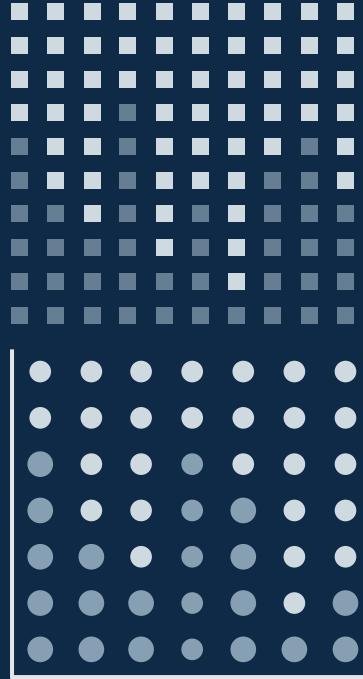












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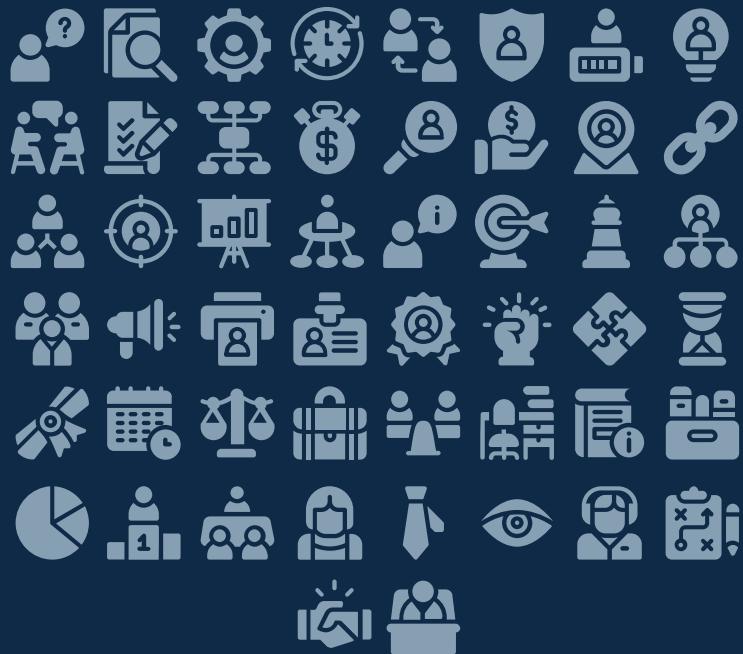
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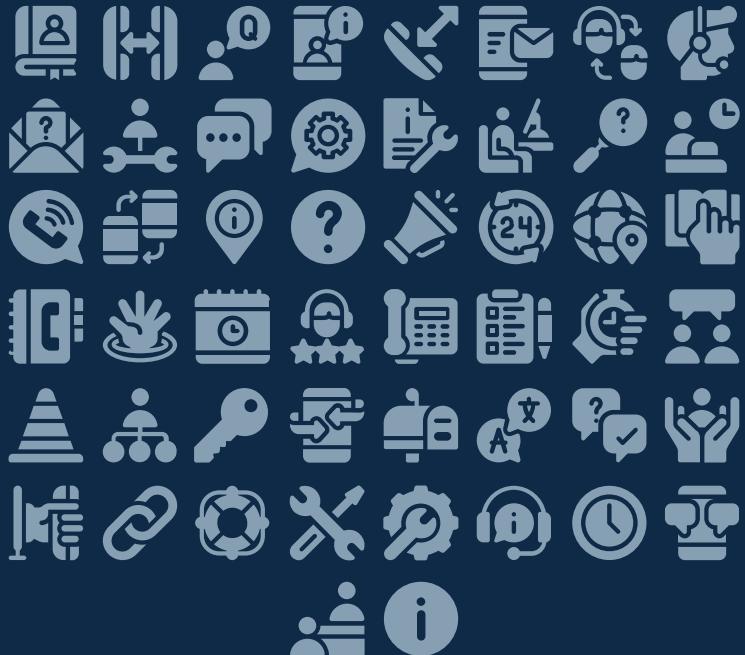
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