ABILITY ARCHITECT

Unlocking Knowledge for Persons with Disabilities

SDG 10 - Reduced Inequalities

6.6 Scatter Plot

A **scatter plot** is a type of graph for visualizing the joint variation in two numerical variables. It is a useful tool for displaying and understanding potential relationships between the variables.

A scatter plot is constructed with the *x*-axis representing one variable and the *y*-axis representing the other variable. It uses dots to indicate the values of the two variables for a particular point in time, which are plotted against the corresponding axes. Suppose an analyst is investigating potential relationships between sector index returns and returns for the broad market, such as the S&P 500 Index. Specifically, he or she is interested in the relative performance of two sectors, information technology (IT) and utilities, compared to the market index over a specific five-year period. The analyst has obtained the sector and market index returns for each month over the five years under investigation and plotted the data points in the scatter plots, shown in Exhibit 30 for IT versus the S&P 500 returns and in Exhibit 31 for utilities versus the S&P 500 returns.

Despite their relatively straightforward construction, scatter plots convey lots of valuable information. First, it is important to inspect for any potential association between the two variables. The pattern of the scatter plot may indicate no apparent relationship, a linear association, or a non-linear relationship. A scatter plot with randomly distributed data points would indicate no clear association between the two variables. However, if the data points seem to align along a straight line, then there may exist a significant relationship among the variables. A positive (negative) slope for the line of data points indicates a positive (negative) association, *meaning the variables move in the same (opposite) direction.* Furthermore, the strength of the association can be determined by how closely the data points are clustered around the line. Tight (loose) clustering signals a potentially stronger (weaker) relationship.

Examining Exhibit 30, we can see the returns of the IT sector are highly positively associated with S&P 500 Index returns because the data points are tightly clustered along a positively sloped line. Exhibit 31 tells a different story for relative performance of the utilities sector and S&P 500 index returns: The data points appear to be distributed in no discernable pattern, indicating no clear relationship among these variables. Second, observing the data points located toward the ends of each axis, which represent the maximum or minimum values, provides a quick sense of the data range. Third, assuming that a relationship among the variables is apparent, inspecting the scatter plot can help to spot extreme values (i.e., outliers). For example, an outlier data point is readily detected in Exhibit 30, as indicated by the arrow. As you will learn later in the CFA Program curriculum, finding these extreme values and handling them with appropriate measures is an important part of the financial modeling process.

Scatter plots are a powerful tool for finding patterns between two variables, for assessing data range, and for spotting extreme values. In practice, however, there are situations where we need to inspect for pairwise associations among many variables—for example, when conducting feature selection from dozens of variables to build a predictive model.

The scatter plot matrix contains each combination of bivariate scatter plot (i.e., S&P 500 vs. each sector, IT vs. utilities, IT vs. financials, and financials vs. utilities) as well as univariate frequency distribution histograms for each variable plotted along the diagonal. In this way, the scatter plot matrix provides a concise visual summary of each variable and of potential relationships among them. Importantly, the construction of the scatter plot matrix is typically a built-in function in most major statistical software packages, so it is relatively easy to implement. It is worth pointing out that the upper triangle of the matrix is the mirror image of the lower triangle, so the compact form of the scatter plot matrix that uses only the lower triangle is also appropriate.

With the addition of the financial sector, the bottom panel of Exhibit 32 reveals the following additional information, which can support sector allocation in the portfolio construction process:

- Strong positive relationship between returns of financial and S&P 500;
- Positive relationship between returns of financial and IT; and
- No clear relationship between returns of financial and utilities.

It is important to note that despite their usefulness, scatter plots and scatter plot matrixes should not be considered as a substitute for robust statistical tests; rather, they should be used alongside such tests for best results.

PROBLEM

Youth with learning disabilities grasp employable skills less effectively.

Question and Answer

Quiz Questions

What is a scatter plot?

A. A type of plot that uses coordinates to display values for two variables for a set of data.

B. A plot that shows the relationship between a single variable and time.

C. A plot that shows the frequency of a single variable.

D. A plot that shows the relationship between three or more variables.

What does the x-axis in a scatter plot represent?

A. It represents the dependent variable.

B. It represents one of the two variables being compared.

C. It represents the time.

Bullet Points

Scatter Plot Creation and Interpretation for Beginners

1. Understand what a scatter plot is

It's a graph that shows the relationship between two numerical variables.
Useful for understanding potential relationships between variables.

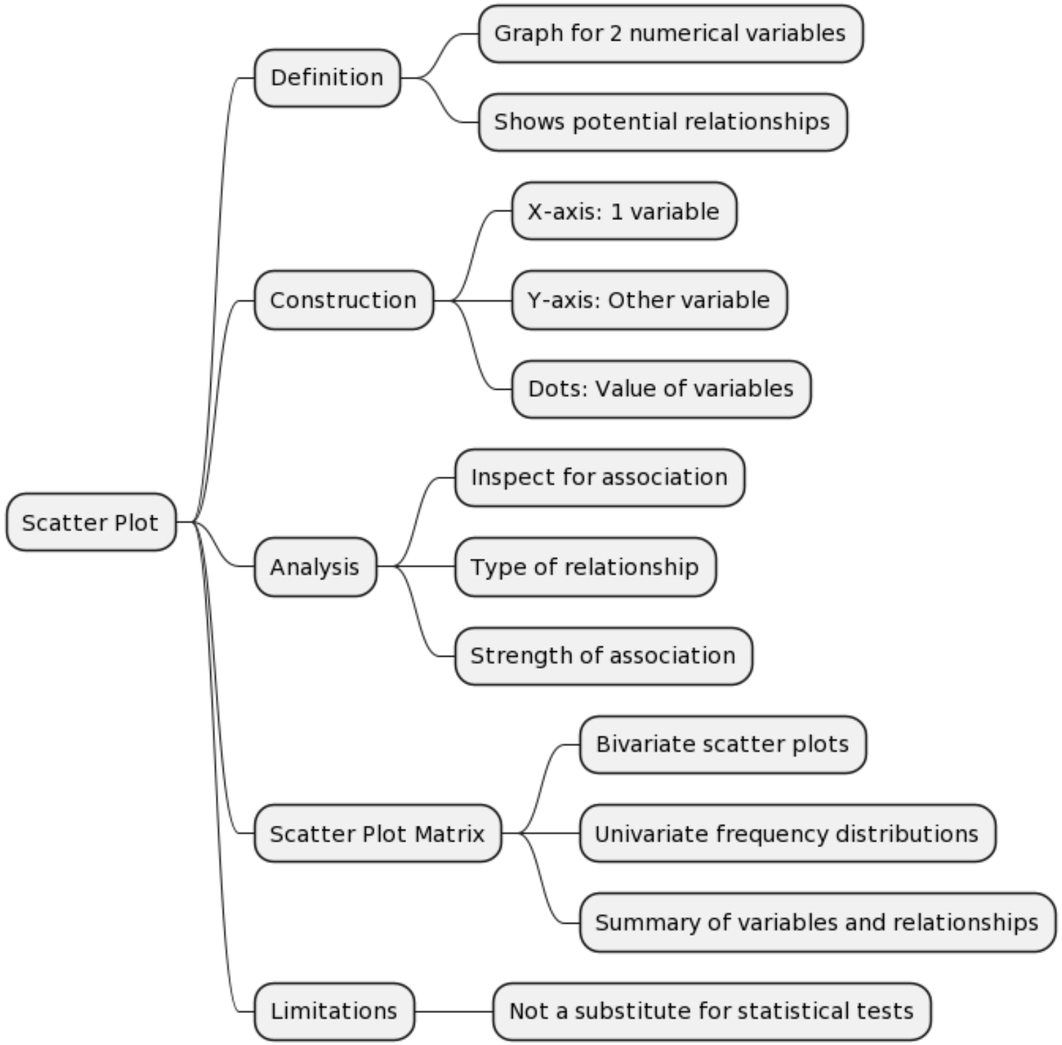
2. How to create a scatter plot

The x-axis represents one variable, and the y-axis represents the other.
Use dots to indicate the values of the two variables for a particular point in time.

3. Analyze data using a scatter plot

Inspect the plot for any potential association between the two variables.
The plot could show no apparent relationship, a linear association, or a non-linear relationship

Mind Map


Scatter Plot
Definition
Graph for 2 numerical variables
Shows potential relationships
Construction
X-axis: 1 variable
Y-axis: Other variable
Dots: Value of variables
Analysis
Inspect for association
Type of relationship
Strength of association
Scatter Plot Matrix
Bivariate scatter plots
Univariate frequency distributions
Summary of variables and relationships
Limitations
Not a substitute for statistical tests

SOLUTION

Generative AI-powered learning platform for persons with learning disabilities.

Target Market Size

2.7% of children in Singapore have learning differences such as ADHD or Dyslexia. (>13,000)

HTTPS://WWW.IFNSINGAPORE.COM/BLOG/WHAT-YOU-NEED-TO-KNOW-ABOUT-LEARNING-DISABILITIES-AND-YOUR-CHILD

Stakeholders

- Disability Organisations
  - Special Need Schools
  - Non-profit Organisations
- Employers
- Families of individuals

Competitors in the Field

Our solution offers:

- personalization
- affordability
- automation

MOOCs (Coursera, EdX)

Not personalised for people with learning disabilities

Personal Tutors

Too expensive in comparison to our platform

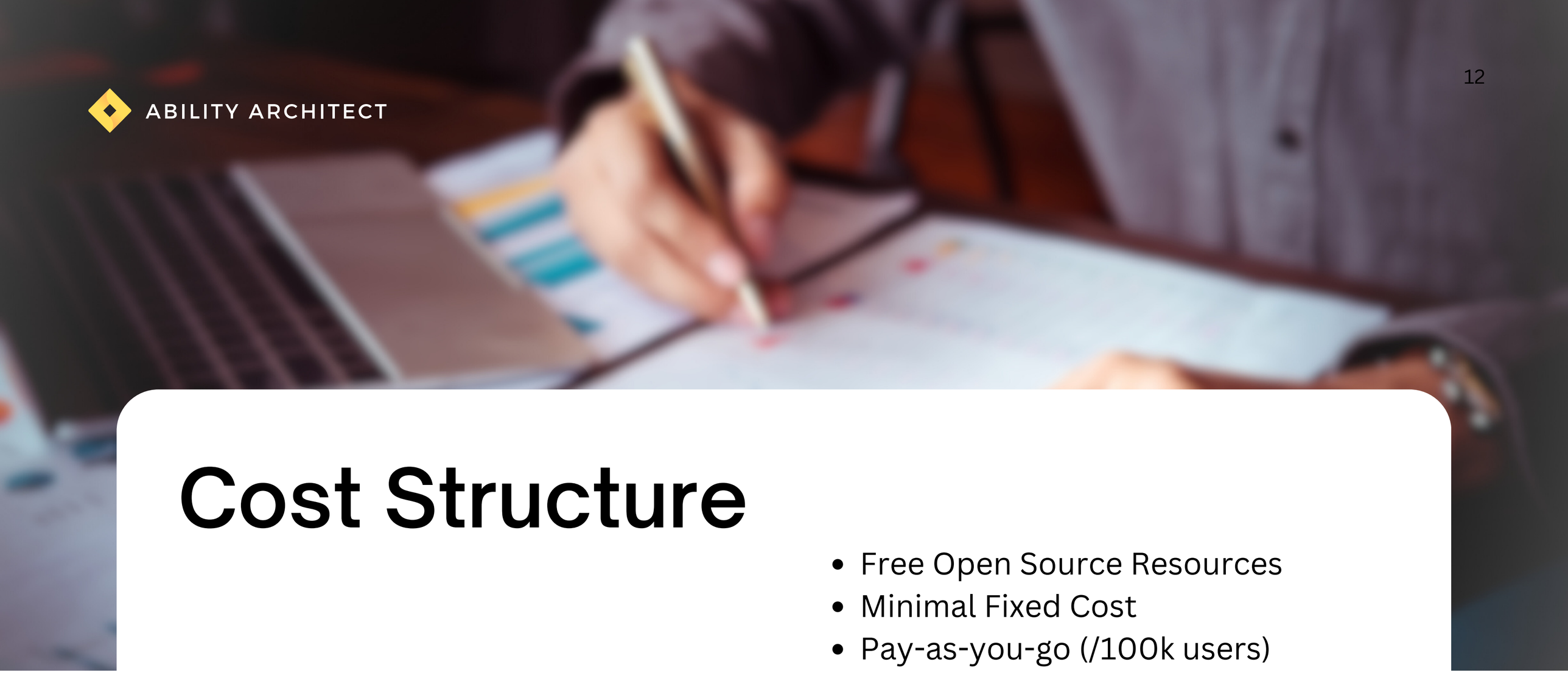
ChatGPT

Requires multiple steps to convert all learning materials repeatedly

Our Product

Stages

1	**DEVELOPMENT**	Host the POC with disability organizations partnerships
2	**GROWTH**	Free online B2C information transformation service
3	**PROFIT**	Offline version for B2B sales



Cost Structure

- Free Open Source Resources
- Minimal Fixed Cost
- Pay-as-you-go (/100k users)
  - $10 ChatGPT API
  - $10 AWS Machine Learning

ABILITY ARCHITECT

Revenue Model

- Initial Kickstart
  - Partner with Market for Good and SGEnable

- Sustained Revenue
  - Sale of Offline Models to Businesses
  - Premium users

Our Team

Jiayi Wang

ChatGPT Prompt Engineer @ IRAS

Charisma Kausar

Software Engineer and UX @ QI

Korey Dai Yang

Machine Learning Enginner @ GIC

Wenbo Jiao

Business Consultant @ EY

Let's make it happen!

Let's chat!

Contact us!

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ABILITY ARCHITECT

APPENDIX

ABILITY ARCHITECT

Market Size

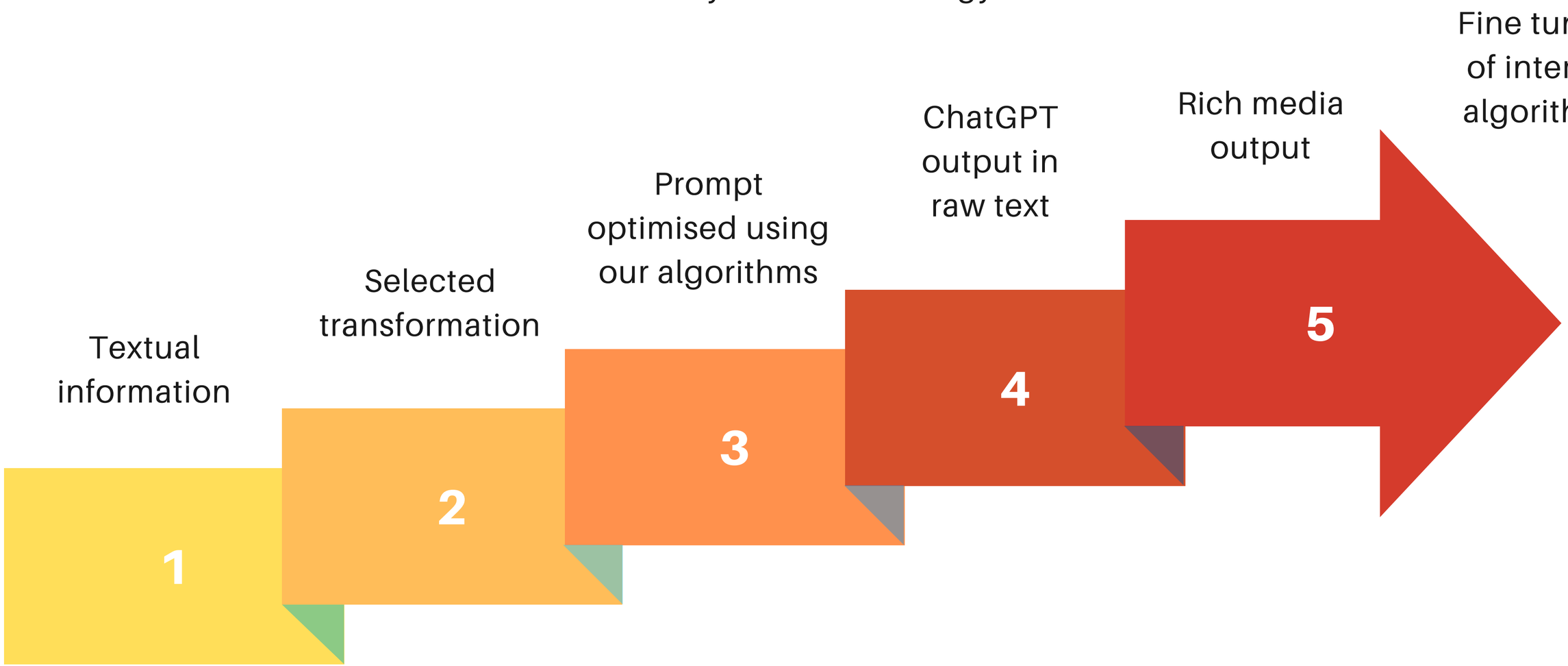
As of 2021, **2.8 million** youths are actively getting services involving special education.

"THE STATE OF LEARNING DISABILITIES TODAY." LEARNING DISABILITIES ASSOCIATION OF AMERICA, LDAAMERICA.ORG/LDA_TODAY/THE-STATE-OF-LEARNING-DISABILITIES-TODAY/. ACCESSED 14 MAY 2023.

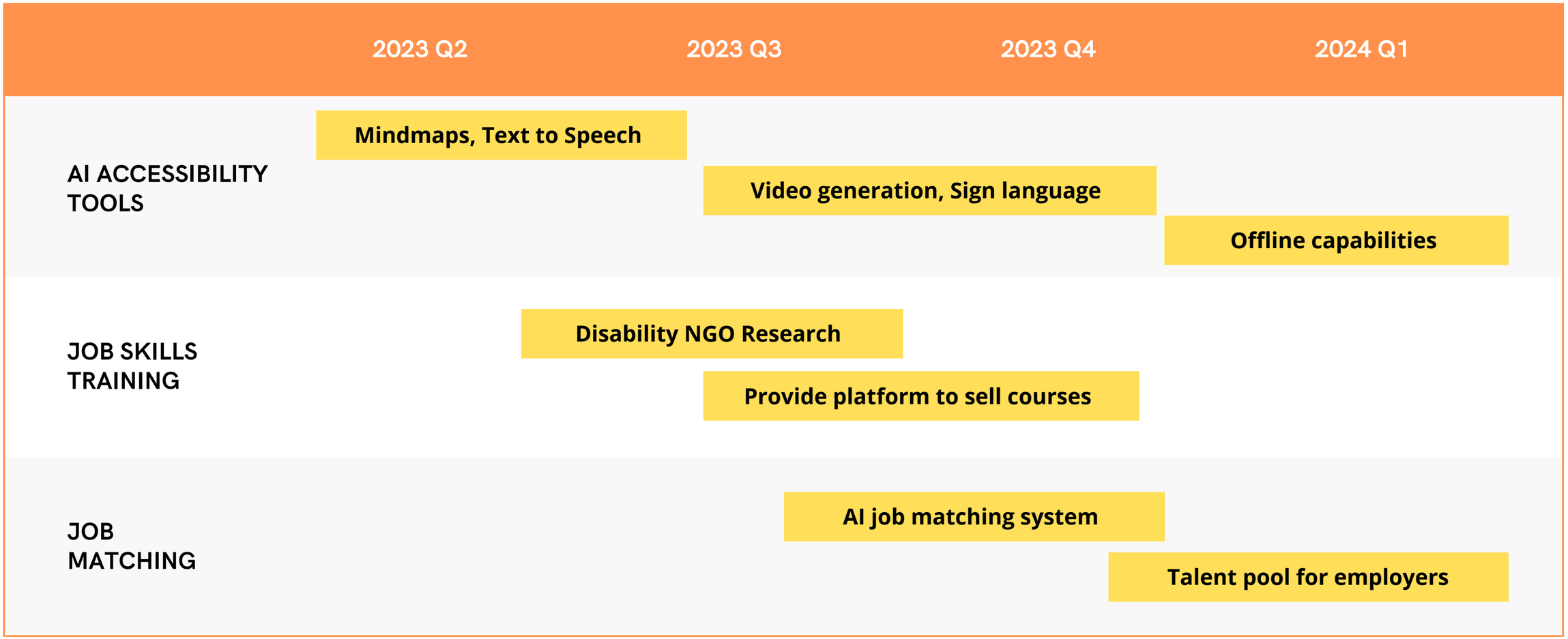
ABILITY ARCHITECT

UNIQUE PIPELINE

Driven by latest technology



Product Roadmap



Phased Release

	2023 Q2	2023 Q3	2023 Q4	2024 Q1
PHASE 0 DEVELOPMENT	Development Gartner Support from Organisations			
PHASE 1 ONLINE SERVICE			Transform Information, powered by ChatGPT4 Train Offline Model to Mimic Online Model	
PHASE 2 OFFLINE SERVICE				Sell Offline Model to Businesses Sync Offline with Online

General-purpose ChatGPT