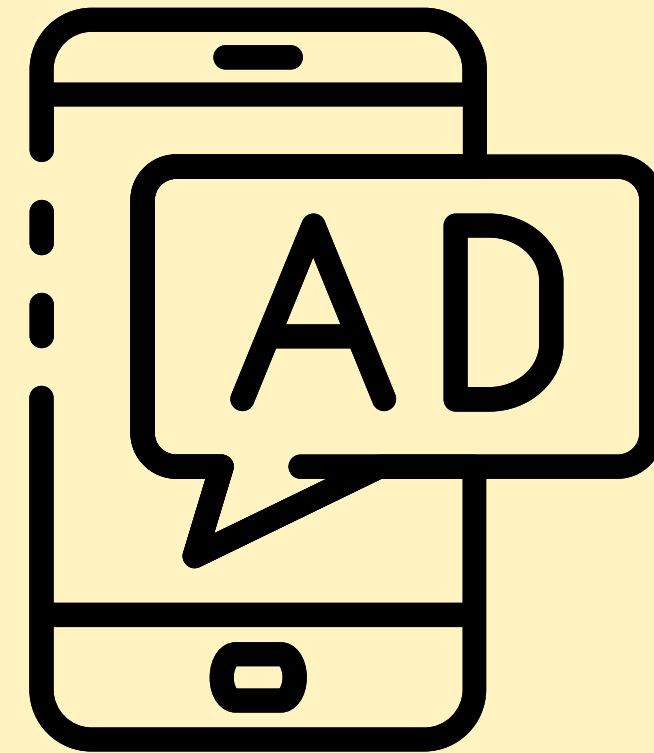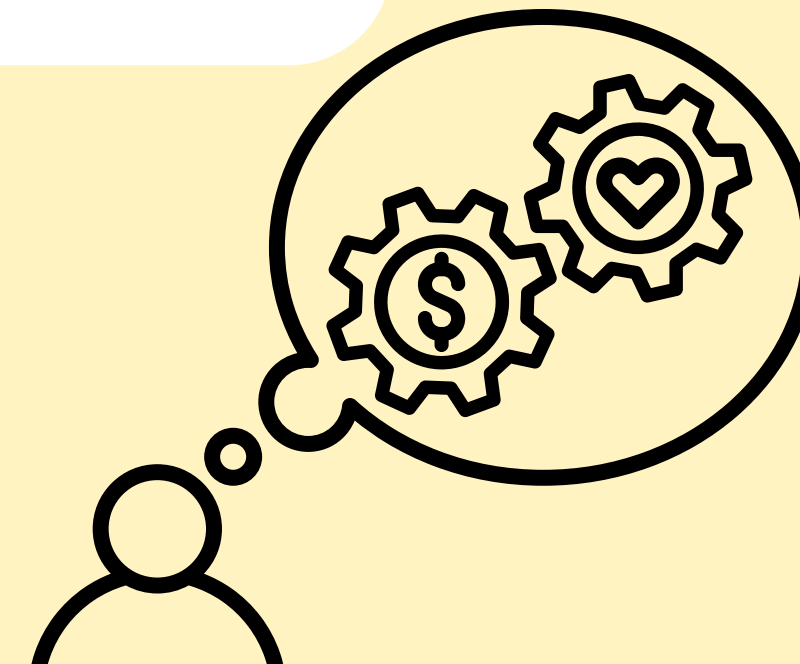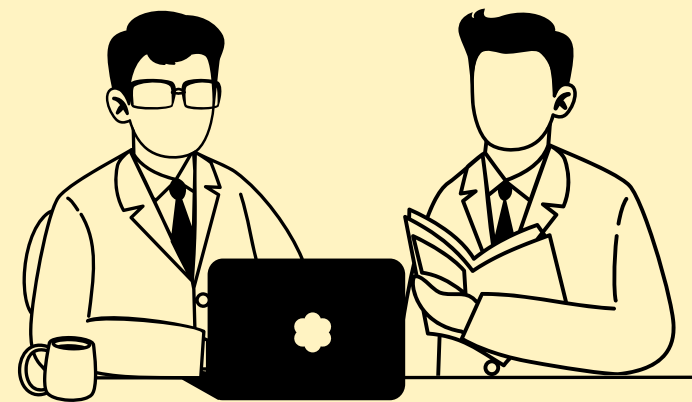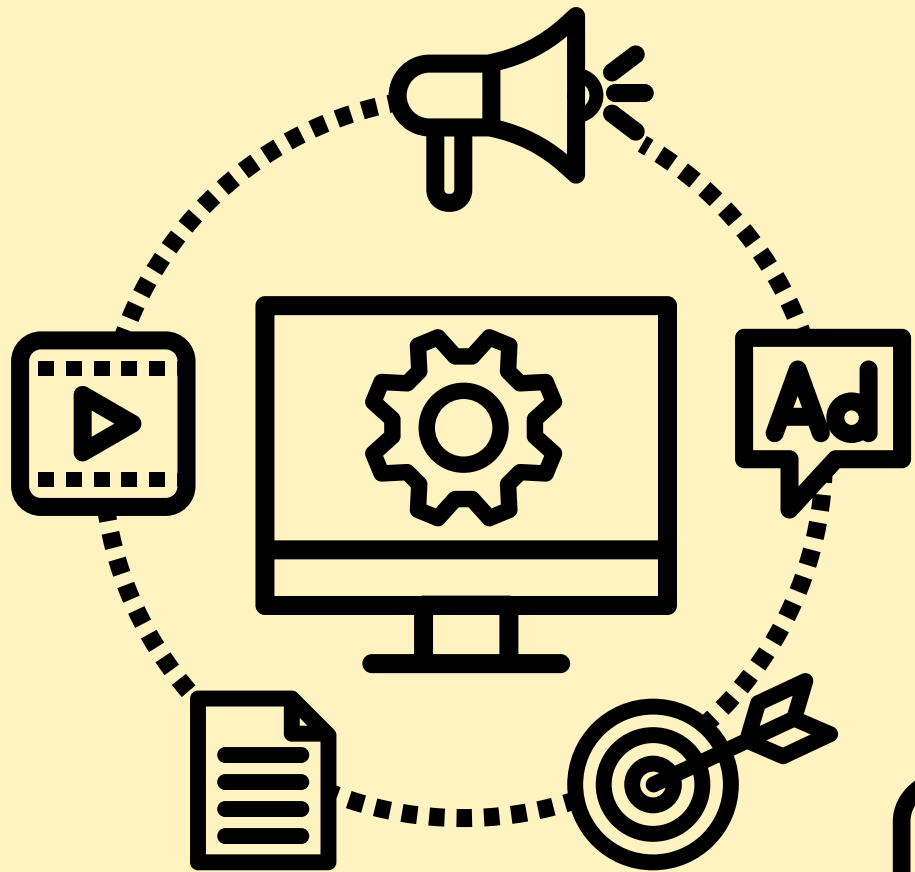# BYTESQUAD

RISHITHA DODDI- MEC- PART 2
ANKUSH- SMST- PART 2
KRISH JAIN- CIVIL-PART 2
SHREYA VERMA- EEE-PART 2

PROBLEM BREAKDOWN

MARKET ANALYSIS:

USER PERSONA

The modern marketing landscape is fragmented and inefficient. Brands struggle with:

- **Attention Economy Crisis**
- **Resource Inefficiency** in Startups and content creators
- **Lack of Personalization**
- **Channel Optimization Gap**

The global digital marketing automation market is valued at $8.42 billion (2024) and growing at 13.3% CAGR. However, **73% of businesses struggle with channel optimization and 68% report difficulty in content personalization.** break it into points

Name: Dev Yadav
Age: 27 years
City: Mumbai
Occupation: Startup Owner

Pain point: Insufficent budget and time for manual marketing labour and analysis

OBJECTIVE

INTERCONNECTED PAIN POINTS 📍

AI x Growth Challenge is to design an **AI-powered solution** that automates and optimizes marketing or growth channels such as LinkedIn, WhatsApp, Instagram, or Twitter

BUDGET CONSTRAINT

LIMITED EXPERIMENTATION CAPACITY

GENERIC MESSAGING

PERFORMANCE TRACKING
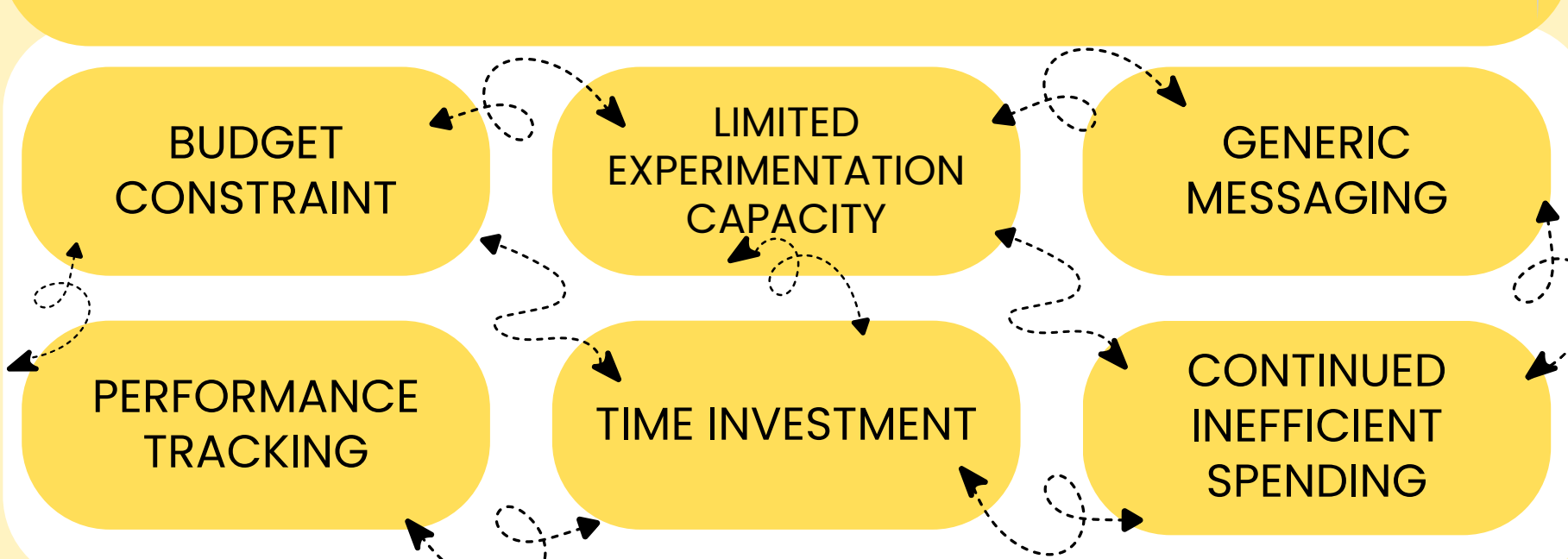
TIME INVESTMENT

CONTINUED INEFFICIENT SPENDING

Name: Riya Pal
Age: 23 years
City: Delhi
Occupation: Influencer

Pain point: Insufficient energy and time for manual analysis of her account

Solution Overview

A Python-based tool to:
- Scrape Instagram post data
- Analyze mood, engagement, visuals, audience
- Output insights + CSV
- Recommend improvements (timing, hashtags, visuals

UVP(UNIQUE VALUE PROPOSITION)

"AI-powered insights that go beyond likes analyzing mood, visuals, timing, and audience to help creators grow smarter and faster."

FEATURES

Data Extraction
Via Instagram API
Data: captions, hashtags, likes, comments, views, demographics, audio, visuals
Content & Mood Analysis:
NLP (TextBlob/VADER) → Classify as: Motivation, Comedy, Brainrot, Informative
Sentiment + frequent comment words
Audio trends & thumbnail style
Engagement Metrics
Watch time, gender ratio, hook performance (first 3s)
CTR, conversion rate
Active hours/days
Visual Analysis
Dominant colors (OpenCV), fonts (OCR)
Suggest color palettes per mood
Output & Recommendations
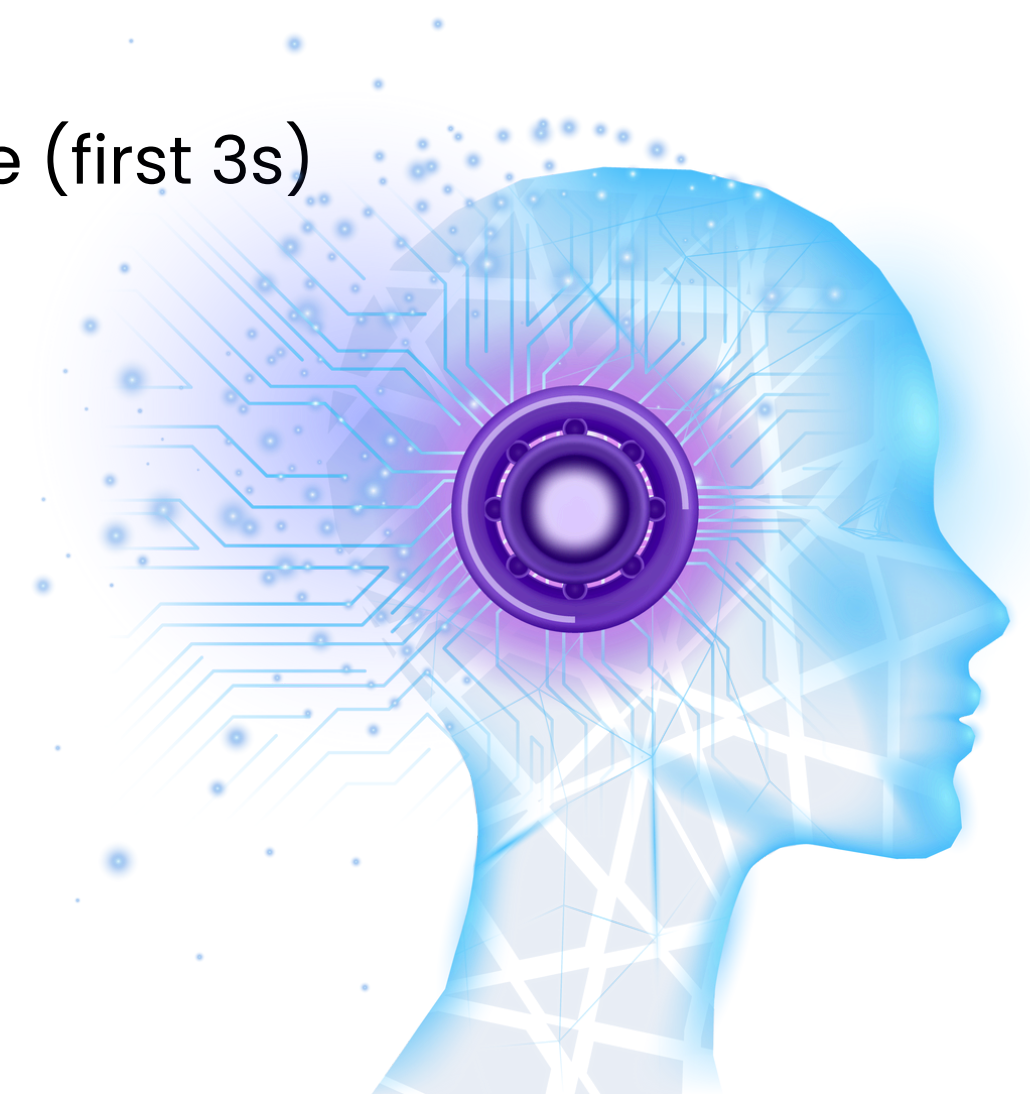Store everything in CSV
Recommend:
A/B test thumbnails
Best post times (per gender/age/location)
Hashtag refinement
Mood-based color palettes

Tech Stack Overview

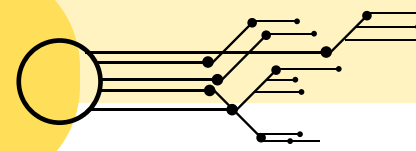## Backend & API Integration
- **Python** – Core programming language for scripting and automation
- **Instagram Graph API** – Fetch media, comments, insights, and demographics
- **Requests** – HTTP requests to access Instagram data
- **dotenv** – Environment variable management for secure token handling

Media & Visual Analysis:
- **OpenCV** –
  1. Motion detection
  2. Face count
  3. Dominant color extraction (via K-means)
- **Pillow (PIL)** – Image processing (thumbnail, RGB conversion)
- **MoviePy** – Video/audio handling, duration extraction
- **FFmpeg** (indirect via MoviePy) – Audio export
- **Librosa** – Audio analysis (tempo, duration, waveform)

Storage & Export
- CSV – For tabular analytics export (used in tools like Excel, Power BI)
- JSON – For structured data storage and downstream ML usage

Web dev part:
Frontend: HTML, CSS, Javascript
Backed: NodeJs, Flask

Data Processing & Analysis
Pandas – Data manipulation and CSV export
NumPy – Numerical operations (image pixel data, color clustering)
JSON – Structured data storage and parsing
TQDM – Progress tracking for loops
Collections.Counter – Word frequency and color analysis

Natural Language Processing (NLP)
- **NLTK** – Tokenization and text preprocessing
- **Hugging Face Transformers** – Sentiment analysis using pretrained models (pipeline("sentiment-analysis"))
- **Text Analysis:**
  - Sentiment tone classification (positive/negative/neutral)
  - Mood inference from captions/comments
  - Common word extraction

AI Impact Assessment – K.A.R.O Model

K – Knowledge
What does the AI system learn, understand, or generate?
- Data sources used (e.g., Instagram posts, comments, demographics)
- Type of insights generated (mood, engagement, timing, audience behavior)
- It enhances human decision-making or automate it.

A – Action
What actions does the AI enable or automate?
- Recommends post timings, hashtags, thumbnail styles, color palettes
- Automates mood classification, sentiment analysis, and visual analysis
- Drives decisions: What to post, when to post, and how to post
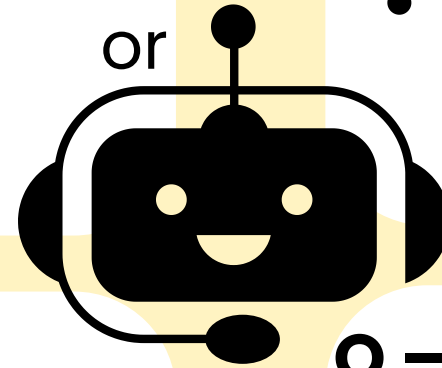
R – Reach
Who is impacted by the AI system, and how far does that impact go?
- Primary: Content creators, digital marketers
- Secondary: Followers, brands, platform engagement
- Scope: Scalable to any platform using video + audience data (YouTube, TikTok)

O – Outcome
What measurable results or value does the AI deliver?
- Higher engagement: CTR, watch time, conversions
- Data-backed creative decisions
- Time saved on manual analysis
- Personalized content strategy → better audience retention and growth

Future Expansion:
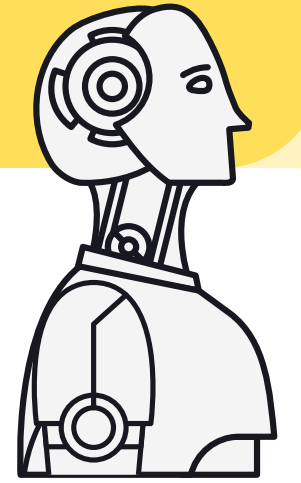
✅ LinkedIn: Analyze post mood (informative, promotional) and Engagement by industry, job role, post timing
✅ Twitter (X):Sentiment analysis, hashtag trends, Virality patterns and timing optimization
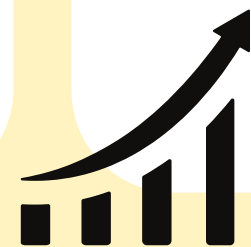✅ WhatsApp Business: Track open & click-through rates, Analyze customer sentiment and conversion flow

Bibliography Links

Personalization, User Retention, and Channel Optimization

- https://www.salesforce.com/blog/marketing-automation/
- https://www.gartner.com/en/marketing/insights/articles/ai-in-marketing
- https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/the-potential-for-ai-in-marketing

AI Marketing & Growth Automation

- https://www.salesforce.com/blog/marketing-automation/
- https://www.gartner.com/en/marketing/insights/articles/ai-in-marketing
- https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/the-potential-for-ai-in-marketing

Tech Stack & AI Tools

- https://stackshare.io/collections/ai-marketing-automation
- Add a little bit of body text
- Add a little bit of body text