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Crop Price Prediction Using AI & Satellite Data

From Data to Decisions in Agriculture

WHAT IS COMMODITY PRICE & ITS IMPORTANCE

COMMODITY PRICE

Commodity price = Market value of agricultural products (e.g., sugarcane, wheat, maize)

Prices vary due to:

- Supply & demand
- Weather conditions
- Market arrivals

IMPORTANCE

- Directly impacts farmer income 💰
- Affects industry planning (e.g., sugar factories)
- Influences national economy

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Why Price Prediction is Necessary

- Farmers sell crops without knowing future prices
- Risk of low prices at harvest time

Benefits

- Better selling decisions
- Crop planning
- Reduced financial losses

Govt Benefits

- Policy making
- Import/export decisions
- Price stabilization

Traditional Methods of Price Prediction

Traditional Methods of Price Prediction

- Historical price analysis
- Market trends observation
- Expert judgement

Limitation

- Not real-time
- No field-level insights
- Low accuracy

Role of AI & Satellite Data

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Satellite data provides

- Crop area
- Crop health
- Growth stage

AI helps

- Analyze large datasets
- Identify patterns
- Predict future trends

👉 **Combination = Accurate & real-time predictions**

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KEY COMPONENTS OF PRICE PREDICTION

CROP AREA ESTIMATION

YIELD PREDICTION

PRODUCTION ESTIMATION

MARKET ARRIVAL

DEMAND ANALYSIS

PRICE FORECASTING

Crop Area Estimation

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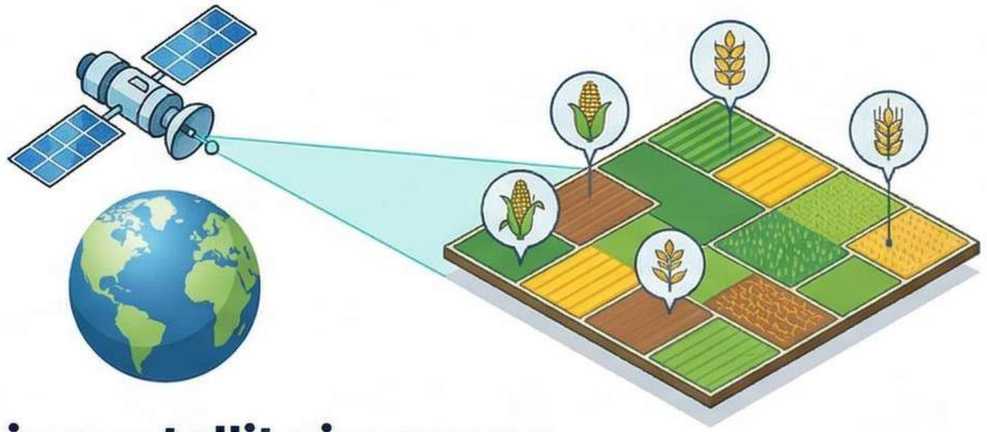


Using satellite imagery:

- Detect crop type
- Measure acreage

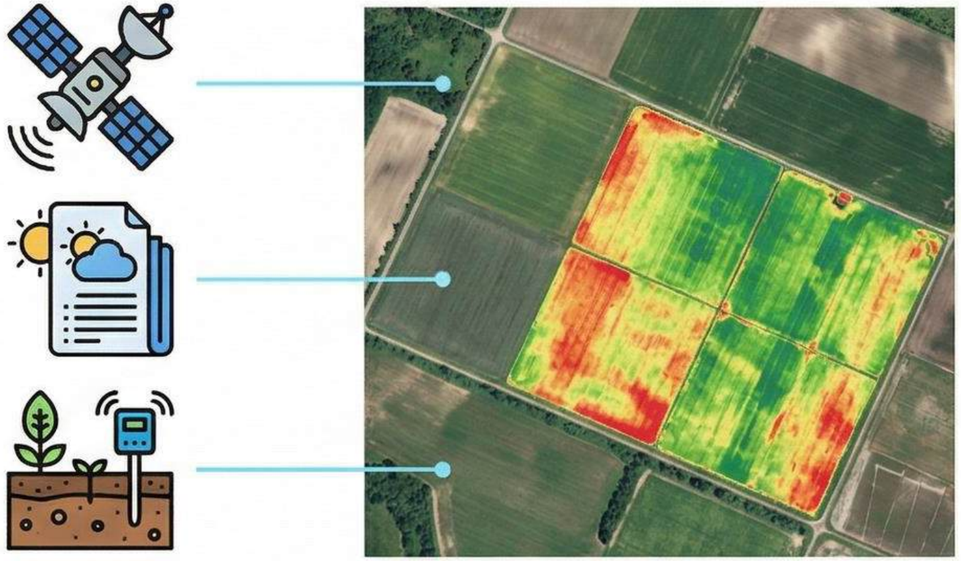
Helps estimate total cultivation area

- Early indication of supply

Yield Prediction (AI + Remote Sensing)

Factors:

- Vegetation indices (NDVI, RVI)
- Weather data
- Soil conditions



AI models predict:

Expected yield per hectare

Production Estimation

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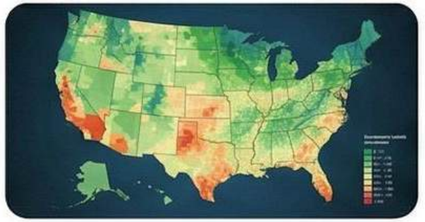
Production = Area × Yield

What we do:

- Combine satellite-derived crop area

- Use AI-based yield models

- Generate region-wise production estimates



Why it matters:

- Early estimation of total supply

- Helps predict market saturation

- Supports policy and procurement decisions

Insight:

- Higher production → Oversupply → Price drop

- Lower production → Shortage → Price rise

Market Arrival of Commodity

What is Market Arrival?

Definition: Quantity of crop reaching mandis/APMC markets

Factors affecting arrival:

- Harvest timing
- Weather conditions
- Storage facilities
- Farmer selling behavior

Role in pricing:

- Sudden high arrivals → Price crash
- Controlled supply → Stable prices
- Less supply → High prices

AI Use:

Predict arrival patterns using historical + crop maturity data

Demand Analysis

Types of Demand

- Consumer demand (food consumption)
- Industrial demand (e.g., sugar mills, ethanol)
- Export demand

Factors affecting demand

- Population trends
- Government policies
- Seasonal demand

AI Role

- Analyze historical demand trends
- Integrate economic indicators
- Forecast future demand levels

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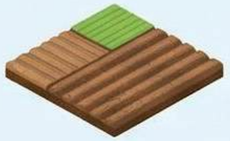
Price Prediction Model

Inputs to Model



Crop Area

Yield

Production

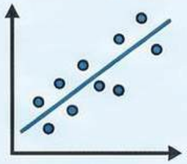
Market Arrival

Demand

Historical Price Data

AI Techniques Used

Time Series Models (ARIMA, LSTM)

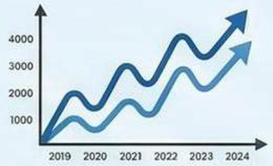


Regression Models

Machine Learning Algorithms

Output

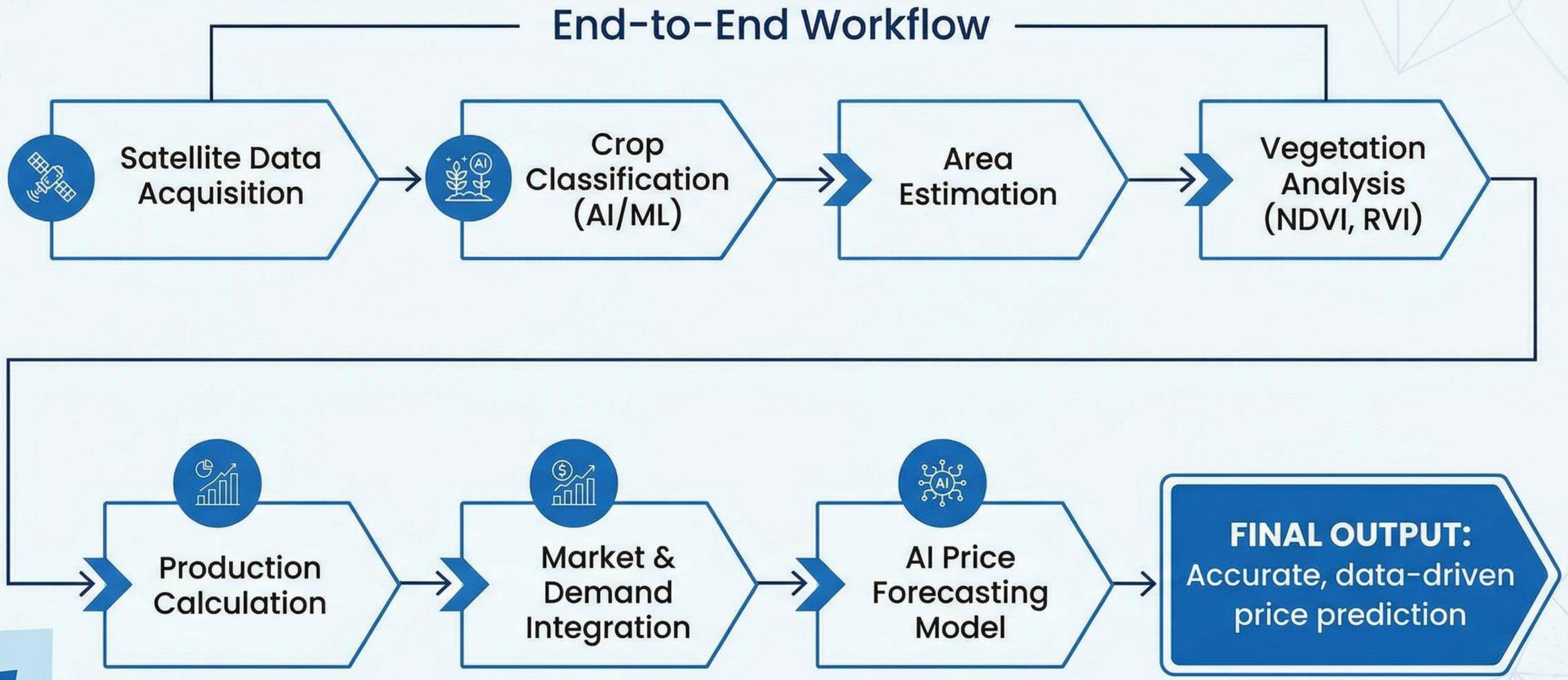
Short-term price forecast



Long-term price trends

Helps in decision-making before harvest

METHODOLOGY



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Real-World Use Case

Sugarcane Agriculture Analysis

Scenario

- Region: Sugarcane growing belt

What we analyze

- Total sugarcane acreage
- Crop growth stage
- Health condition

Output

- Estimated production
- Expected market arrival
- Price trend prediction

Impact

Sugar factories can:

- Plan crushing capacity
- Optimize logistics
- Avoid raw material shortage

Benefits of AI + Satellite Approach

For Farmers

- Decide when to sell
- Avoid distress selling
- Improve income

For Industries

- Better procurement planning
- Reduce supply uncertainty
- Cost optimization

For Government

- Better MSP planning
- Import/export decisions
- Food security management

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Thank You!

Data-driven decisions can transform agriculture profitability

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