

Using LLMs to 'Break Down' the Black Box

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Topics

What are Large Language Models (LLMs)?

What are GPTs?

How can both be used to help break down the travel model black box?

Examples of travel model-related GPTs

LLMs & GPTs...What are they?

- Large Language Models (LLMs)
 - An AI system trained on massive amounts of data so it can understand and generate human-like language
 - LLMs learn patterns, facts, and relationships in language, enabling them to answer questions, write text, summarize information.
 - Examples: ChatGPT, Claude, Grok, and many others
 - LLMs can also be the “engines” that power other many AI applications
- Generative Pre-Trained Transformers (GPTs)
 - A type of LLM that can be customized for specific purposes
 - Example customizations include:
 - By topic: law, medicine, etc.
 - By task: image generator, file converter, creative writing, transcribe audio, etc.
 - By style: formal, casual, etc.

GPTs: Application to Travel Modeling

How they work:

- 1) Identify **LLM** to use
- 2) Develop **Knowledge Base**
- 3) **Instruct** the GPT how to best address user queries
- 4) **Test** the GPT for reasonableness and reliability
- 5) **Distribute** GPT weblink to users

“Break Down” the Black Box

“Bridge the gap” between technical analyses & questions from non-technical stakeholders:

Input: ***natural language*** queries

Data: technical modeling data

Output: ***natural language*** answers

Examples:

1. Documentation reference
2. Model data queries
3. Data manipulator

GPT #1



Ask Me About CFRPM 7 GPT

By David Schmitt 

Provides answers to questions using the Central Florida Regional Planning Model Version 7 (CFRPM 7) model documentation. It does not provide detailed information about model results at this time. Please contact info@insighttcinc.com with any questions.

Which counties
are in CFRPM 7?

What software
does CFRPM
7 use?

How was the
employment
data verified?

How were
the socio-
demographic...

Documentation reference for:
Central Florida Regional Planning Model 7
(CFRPM 7)

Ask Me About CFRPM 7

Knowledge Base & Instructions

Knowledge Base

- User's guide
- Model description report
- Model validation report
- Data dictionary (selected file formats)
- Training materials
- Facts list

Knowledge base materials converted to Markdown format

Instructions

- Response scope
- Response style & quality
- Security
- Follow-up questions

Instructions provided in Word



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- Which counties are in CFRPM 7?
- What software does CFRPM 7 use?
- How was the employment data verified?
- How were the socio-demographic variables...

+ Ask anything

GPT #2



Ask Me About CFRPM 7 Data GPT

By David Schmitt 

Provides answers to questions about the Central Florida Regional Planning Model Version 7 traffic results for the years 2015-2045 (in 5 year increments). Currently, traffic data can be provided for intersections or roadway segments.

What roadway segments have the top 5 largest...

What is the volume at the intersection of ...

Provides access to roadway segment & intersection volumes for 2015-2045 by time period

Offers ability to visualize traffic data with download

Ask Me About CFRPM 7 Data

Knowledge Base & Instructions

Knowledge Base

- Intersection data (CSV)
 - Roadway names, approach direction, area & facility types, county, lanes, speeds, AM / MD / PM / NT / daily volumes for 2015-2045
- Roadway segment data (CSV)
 - Same data organized by roadway segments

Roadway1	SR 44
Roadway2	CR 143
Direction_in_2015	EB
NumberOfLanes_in_2015	2
PostedSpeedInMilesPerHour_in_2015	55
AreaType_in_2015	31: Residential Area of Urbanized Areas
FacilityType_in_2015	23: Divided Arterial Class I
County_in_2015	SUMTER
MPO_in_2015	Lake Sumter
DistanceInMiles_in_2015	0.19
DailyTrafficVolume_AMPeak_in_2015	1,432
DailyTrafficVolume_Midday_in_2015	3,435
DailyTrafficVolume_PMPeak_in_2015	3,095
DailyTrafficVolume_Evening_in_2015	2,757
DailyTrafficVolume_Daily_in_2015	10,719
DailyCapacity_AMPeak_in_2015	3,700
DailyCapacity_Midday_in_2015	6,300
DailyCapacity_PMPeak_in_2015	3,800
DailyCapacity_Evening_in_2015	5,800

Instructions: general data analysis



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What roadway segments have the top 5 largest 2025...

What is the volume at the intersection of SR 434 and...

+ Ask anything



GPT #3



GTFS GPT

By David Schmitt 

Provides GTFS basic editing with natural language query.
Upload a compressed (zipped) file of GTFS files to request
information or modify the GTFS files.

General Transit Feed Specification:
standardized data format used by most
transit agencies to describe their service
(key input to FTA's STOPS model)

Provides GTFS basic editing with natural
language query

Upload a compressed (zipped) file of GTFS
files to request information or modify the
GTFS files

GTFS GPT

Knowledge Base & Instructions

Knowledge Base

- GTFS.org reference & best practices
- Instructions for minor tasks:
 - Modifying headway
 - Modifying route type (see right: sample)
 - Removing agency
 - Add agency
 - Add stop/station
- Python scripts to handle advanced tasks:
 - Adding and extracting route(s)
 - Filtering sets of routes
 - Deleting routes
- Instructions: step-by-step (see right)

PRIMARY ACTION: MODIFYING ROUTE_TYPE

Objective:

Update the `route_type` value for a specific route within a GTFS feed by modifying the appropriate CSV files, primarily `routes.txt`, while ensuring data consistency and validation throughout the process.

Step-by-Step Instructions for the Custom GPT

1. **Initialization and Input Gathering**

1. **Welcome and Context Setup:**
2. **Request Required Files:**
3. **Collect User Input Details:**

2. **Processing the GTFS Feed**

1. **Parse the Feed Files:**
2. **Locate the Target Route Record:**
3. **Modify the `route_type`:
4. **Save the Modified File:**

3. **Consistency and Optional Additional Updates**

1. **Review Dependent Files:**
2. **User Query:**

4. **Validation and Packaging**

1. **GTFS Feed Validation:**
2. **Repackage the Feed (if applicable):**
3. **Log and Report the Changes:**

5. **Final Output**

1. Output the Updated Files:
2. Summary Message

ChatGPT - GTFS GPT

chatgpt.com/g/g-67a1694f44648191a0777c9c728008c8-gtfs-gpt

GTFS GPT 4o

GTFS GPT

By David Schmitt

Provides GTFS basic editing with natural language query. Upload a compressed (zipped) file of GTFS files to request information or modify the GTFS files.

+ Ask anything

Transportation Consulting

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Lessons Learned

Constructing a Travel Modeling-Oriented GPT

- Recommend re-casting model-related data into formats & structures better compatible for your GPT objective
 - Markdown, not Word or PDF
 - CSV or JSON, not Excel
 - Data designed for filtering & analysis, not for model processing
- Performance varies depending on outside factors
- Be honest if hallucinations (“drifts”) occur
- Instructions are crucial: be specific!
- Periodically update instructions & add functionality

Please provide your feedback to
David.Schmitt@Insighttcinc.com

Ask Me about
CFRPM 7

Model documentation reference



Ask Me About
CFRPM 7 Data

Model data querying



GTFS
GPT

Transit network manipulation



Thank you!

