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DSPy: Stop Prompting, Start Programming Your AI

3 min read · Oct 2, 2025



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If you've ever spent hours tweaking prompts, you know how frustrating it can be.

Change a word here, add "step by step" there... and suddenly, your results are either improved or completely broken. It's frustrating.

That's where **DSPy** comes in.

Instead of playing the endless prompt game, DSPy lets you *program* your language models.

You write Python code, not prompts.

The framework handles all the messy stuff under the hood and even knows how to optimise itself.



DSPy: *Programming*—not prompting—Foundation Models

. . .

So, what's DSPy?

DSPy stands for **D**eclarative **S**elf-improving **P**ython.

The idea is simple: instead of feeding your model fragile prompts, you write clean, modular Python code.

DSPy takes care of turning that code into instructions the LM understands — and it even knows how to optimise itself over time.

That means:

- No more brittle prompts.
- Faster iteration.
- Reusable modules that don't break every time you switch models.

Whether you're creating a simple classifier, setting up retrieval-augmented generation (RAG), or developing an agent loop, DSPy offers a streamlined, high-level approach to accomplish it.

. . .

Getting Started (yes, it's dead simple)

Install it like any other Python package:

```
pip install dspy
```

Or grab the bleeding-edge version:

```
pip install git+https://github.com/stanfordnlp/dspy.git
```

Now hook up your favourite LM. For example, with OpenAI:

```
import dspy

lm = dspy.LM("openai/gpt-4o-mini", api_key="YOUR_OPENAI_API_KEY")
dspy.configure(lm=lm)
```

Done. That's your setup.

. . .

Calling a Model Without Prompts

Here's where it feels different. You don't sit around crafting text prompts. Instead, you *declare* the task.

Example: a math question.

```
math = dspy.ChainOfThought("question -> answer: float")

result = math(question="Two dice are tossed. What is the probability the sum eq
print(result)
```

And DSPy just... does it:

```
Prediction(  
    reasoning='36 outcomes, only (1,1) gives sum=2. Probability = 1/36.',  
    answer=0.0277776  
)
```

Notice what happened? You didn't have to tell the model to "think step by step" or "explain the math." DSPy handled that for you.

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Building Modules the Easy Way

DSPy has different modules for different jobs. A few you'll probably use right away:

- `dspy.Predict` → for simple predictions
- `dspy.ChainOfThought` → for reasoning-heavy tasks
- `dspy.ReAct` → for agents that need reasoning + tools

Here's a tiny classifier:

```
classifier = dspy.Predict("text -> label: {positive, negative}")  
classifier(text="This product is amazing!")
```

It feels more like defining a function than writing a clever prompt.

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Making Your AI Smarter with Optimisers

Okay, here's the part that blew my mind: DSPy can **optimise itself**.

Let's say you built a ReAct agent that uses a Wikipedia search. Usually, you'd spend hours trying to tune the prompts. With DSPy, you can just run an optimiser on it.

```

import dspy
from dspy.datasets import HotPotQA

dspy.configure(lm=dspy.LM("openai/gpt-4o-mini"))
def search_wikipedia(query: str) -> list[str]:
    results = dspy.ColBERTv2(url="http://20.102.90.50:2017/wiki17_abstracts")(q
    return [x["text"] for x in results]
trainset = [x.with_inputs('question') for x in HotPotQA(train_seed=2024, train_
react = dspy.ReAct("question -> answer", tools=[search_wikipedia])
tp = dspy.MIPROv2(metric=dspy.evaluate.answer_exact_match, auto="light", num_th
optimized_react = tp.compile(react, trainset=trainset)

```

One quick optimisation run, and accuracy jumps from ~24% to ~51%. No manual fiddling. Just hit “optimise.”

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Why This Feels Like a Big Deal

DSPy is the natural evolution of working with LMs. We started with prompts. Then came chains and agents. Now we’re at a point where we can *program* AI the same way we program everything else.

And because DSPy is modular, you can mix and match:

- OpenAI, Anthropic, Gemini, Databricks, or even local models on your laptop/GPU.
- Plug in optimisers when you want performance boosts.
- Scale from a quick script to a full-blown AI system.

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Final Thoughts

Look, prompts had their moment, but they’re a hassle to maintain. DSPy seems comparable to the move made decades ago from tinkering with raw machine code to coding in high-level languages. It’s cleaner, faster, and much more enjoyable to work with.

If you're curious, grab it:

```
pip install dspy
```

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Responses (6)



Bgerby

What are your thoughts?



Jan L

Oct 6



And before we blinked our eyes, there we are: back to code.

And creating whole new coding languages.

We already have: POML (Microsoft), DSPy & PDL (IBM), PromptML, PromptL, BAML, Convo-Lang, and SPML

And there will be many, many more.

So much for... [more](#)




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