CAVIA:
Fast **C**ontext **A**daptation **via** Meta-Learning

Luisa Zintgraf

Kyriacos Shiarlis

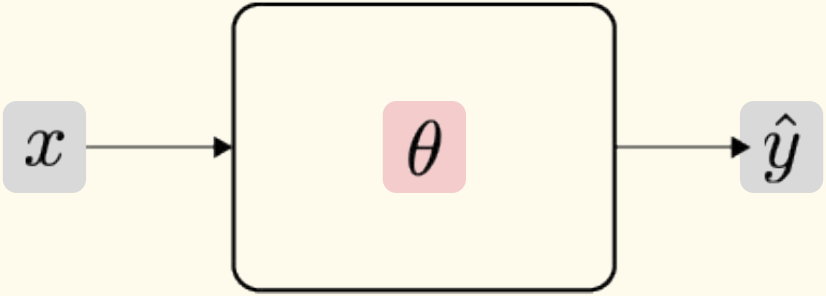
Vitaly Kurin

Katja Hofmann

Shimon Whiteson

Meta-Learning for Fast Adaptation:

- Learn how to map x to y, on new tasks, fast and with little data.



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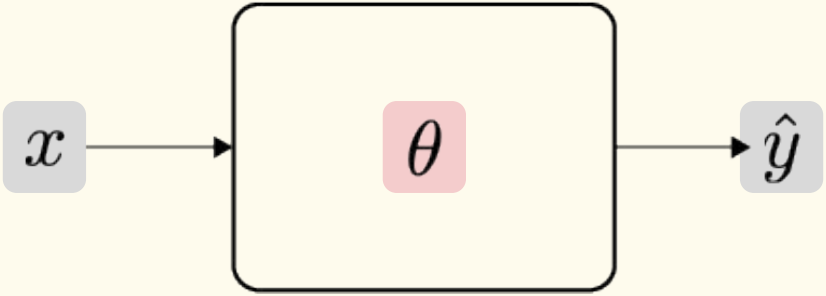

- MAML (Finn et al. 2017): learns model initialisation st. new task can be learned within a few gradient updates

CAVIA: Fast **C**ontext **A**daptation **via** Meta-Learning

Less prone to overfitting compared to MAML

Interpretable

Easy to parallelise

Many tasks / benchmarks only require **task identification**

Updating all model parameters at test time isn’t necessary!

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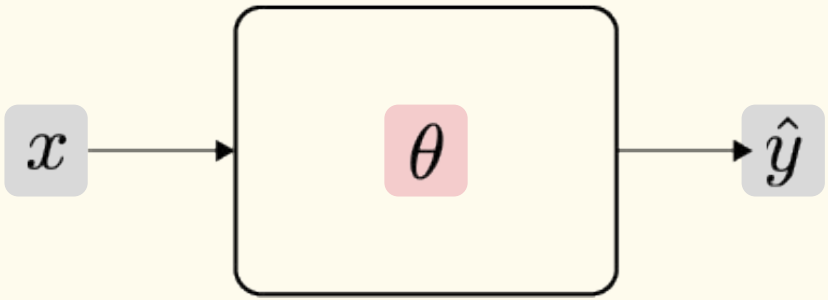
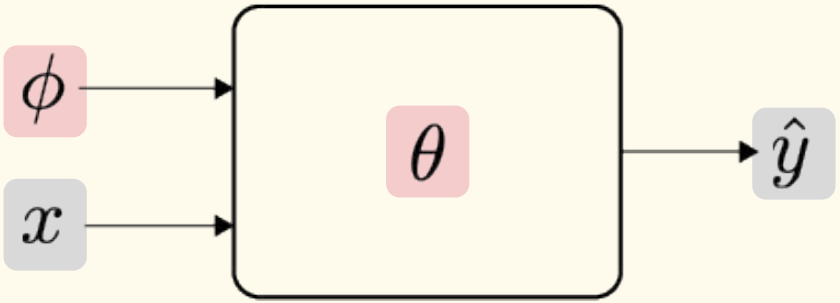
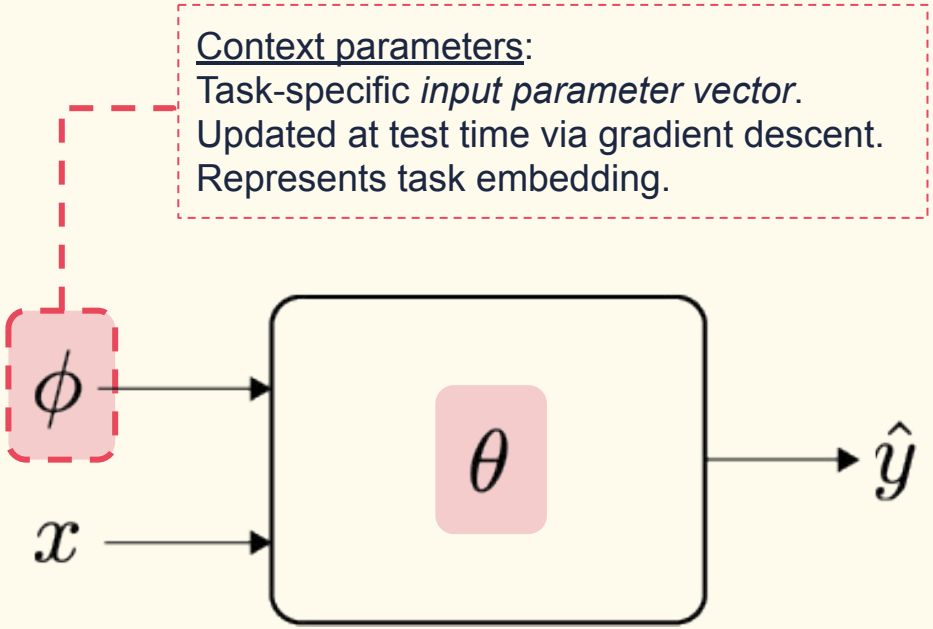
Solution: Adapt only part of the network!

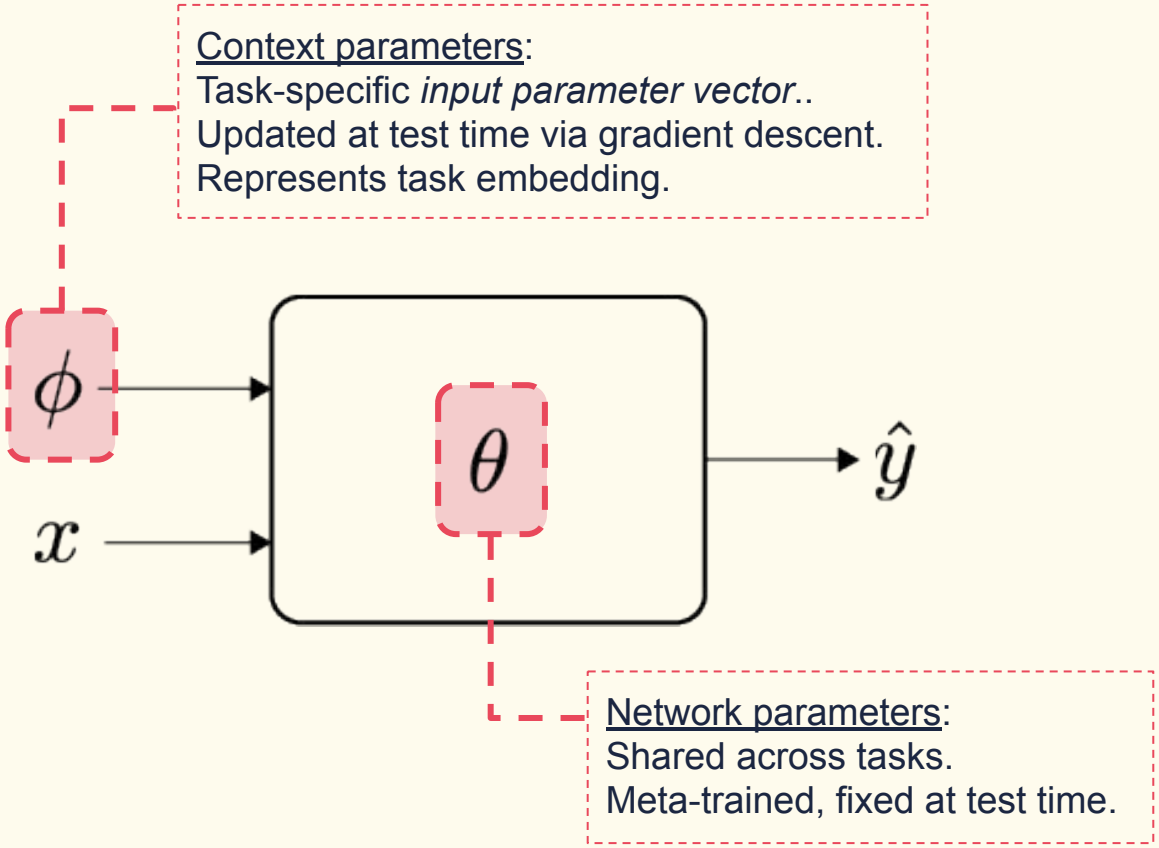
MAML (Finn et al. 2017)



CAVIA




Context parameters:
Task-specific *input parameter vector*.
Updated at test time via gradient descent.
Represents task embedding.
ϕ
x
θ
$\hat{y}$


Context parameters:
Task-specific *input parameter vector*..
Updated at test time via gradient descent.
Represents task embedding.
ϕ
x
θ
$\hat{y}$
Network parameters:
Shared across tasks.
Meta-trained, fixed at test time.

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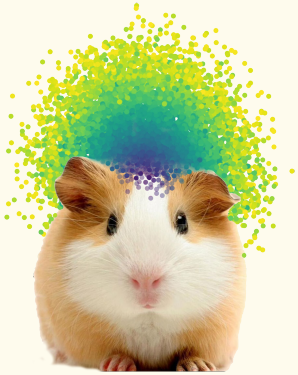
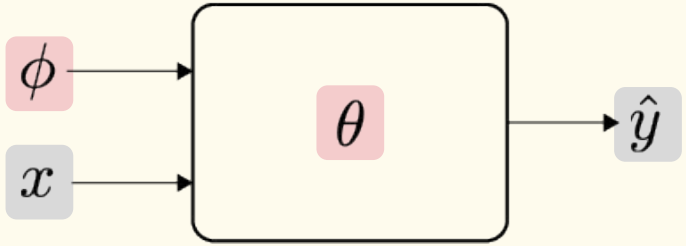
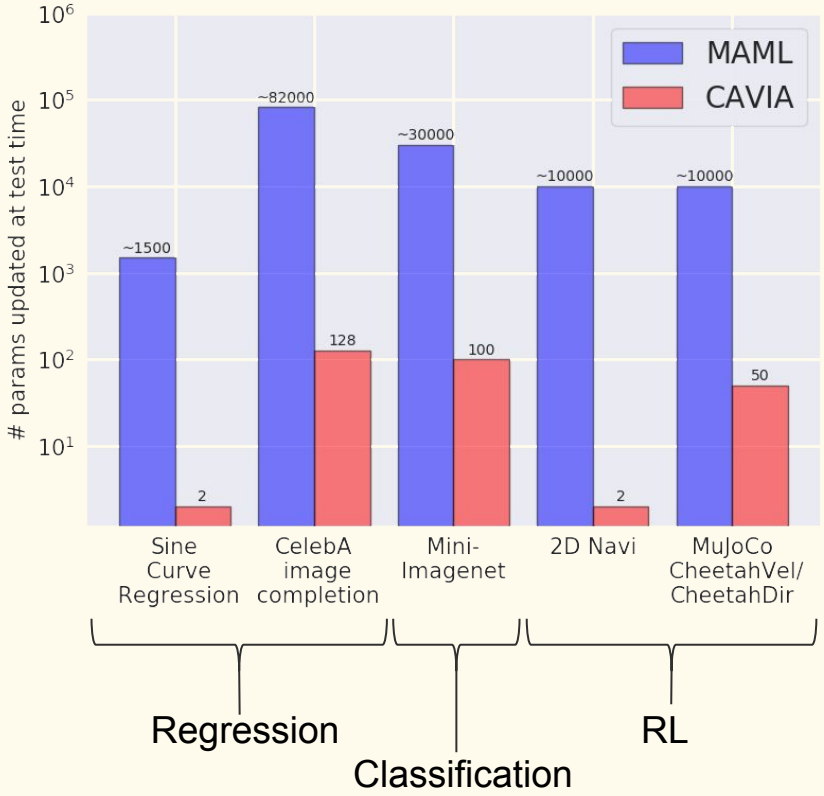


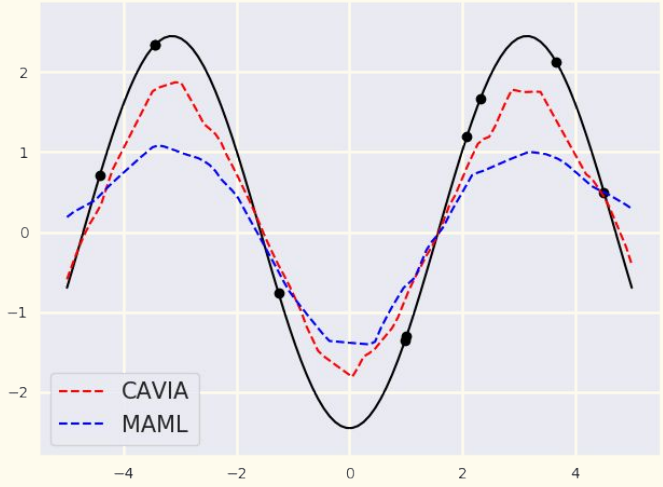




Many tasks / benchmarks only require **task identification**

CAVIA: Sine Curve Experiments

Task defined by amplitude + phase

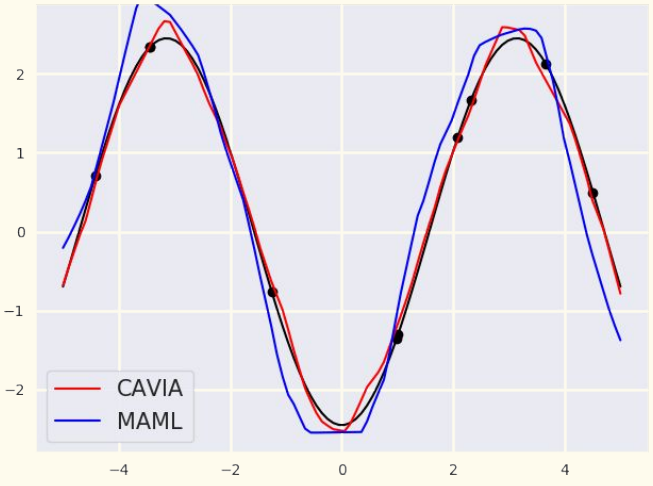


Before update

MAML: ~ 1500 params

CAVIA: 2 params

Gradient update



After update

Could be re-used for related / auxiliary tasks, or distributed systems

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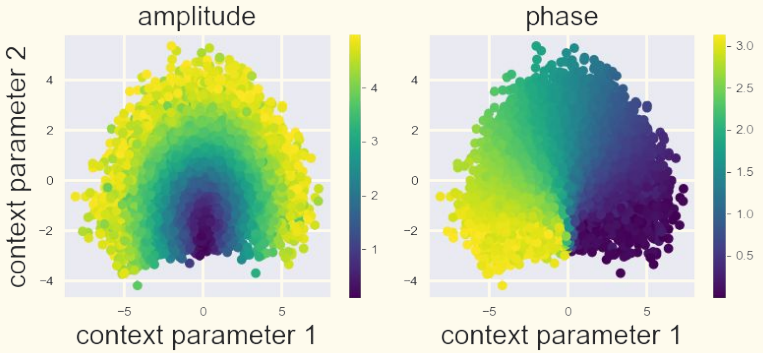
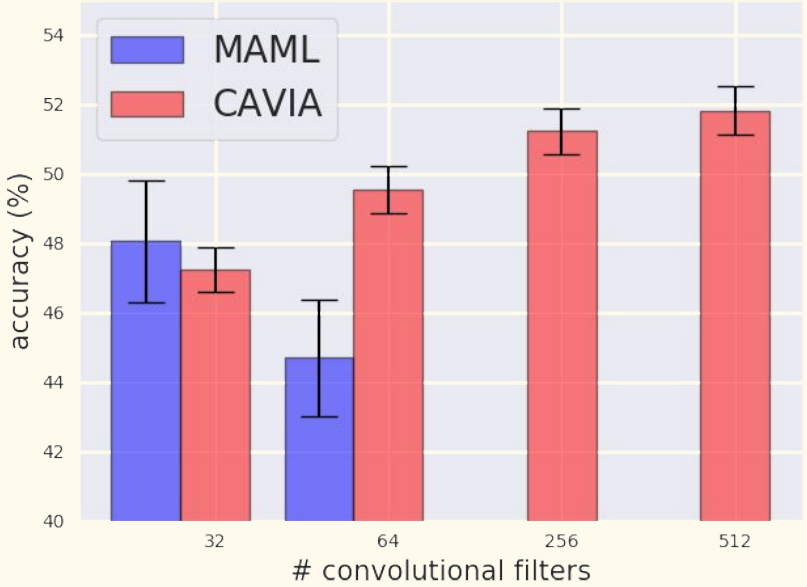
Context parameters are interpretable



CAVIA: Mini-Imagenet Experiments



Model parameters: > 30,000
Context parameters: 100

Less prone to overfitting compared to MAML

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Code: github.com/lmzintgraf/cavia
Blog: whirl.cs.ox.ac.uk/blog/cavia
Contact: luisa.zintgraf@cs.ox.ac.uk
@luisa_zintgraf

Poster
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Luisa Zintgraf

Kyriacos Shiarlis

Vitaly Kurin

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