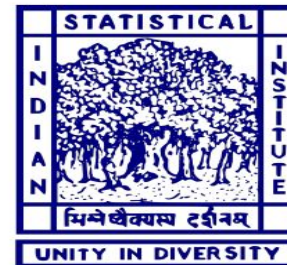


# On Testing of Samplers

Kuldeep S. Meel<sup>1</sup>,  
Yash Pote<sup>1</sup>,  
Sourav Chakraborty<sup>2</sup>

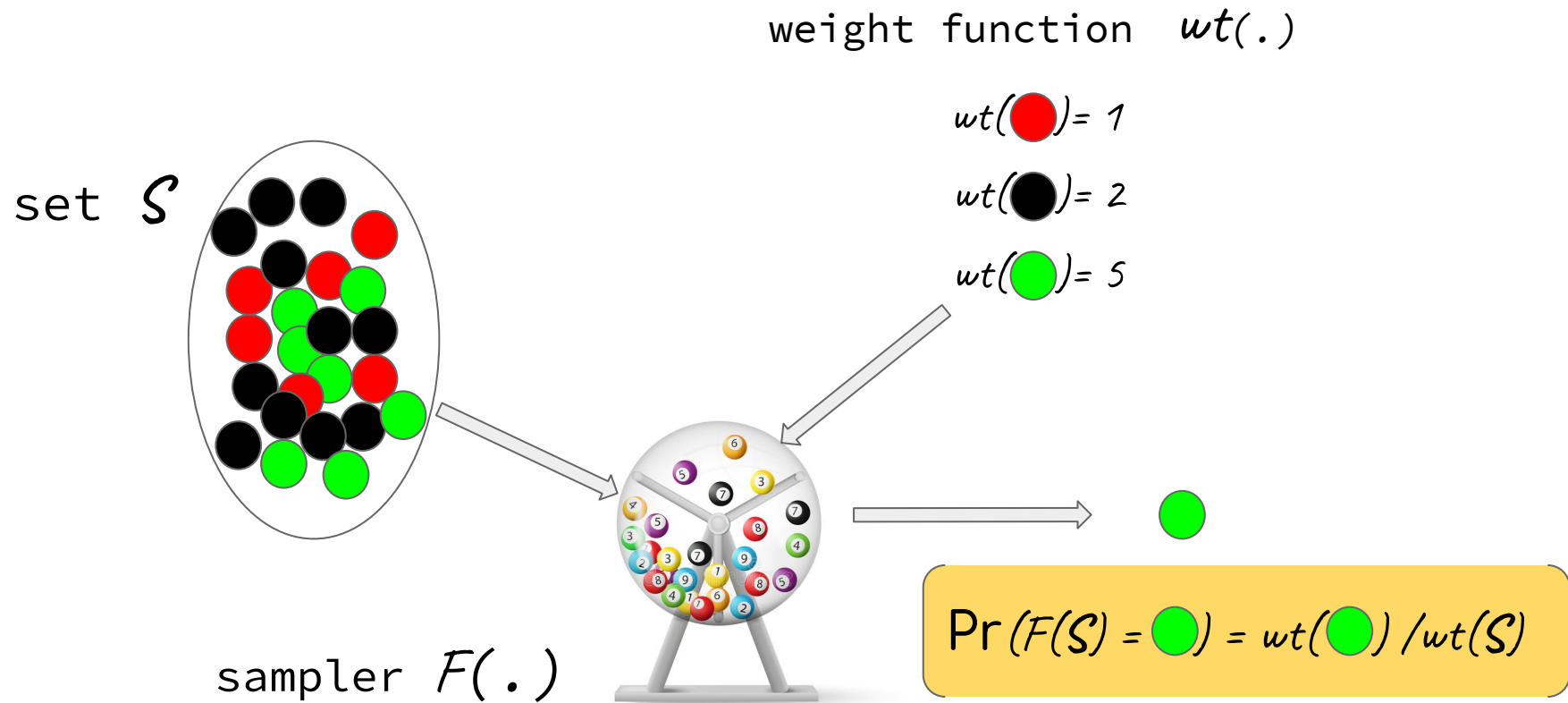


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<sup>1</sup>National University of Singapore

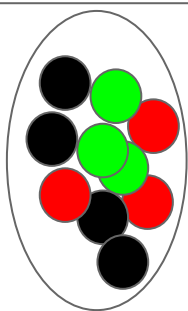
<sup>2</sup>Indian Statistical Institute, Kolkata

# What are samplers?



# What are testers?

set  $\mathcal{S}$



sampler  $F(\cdot)$



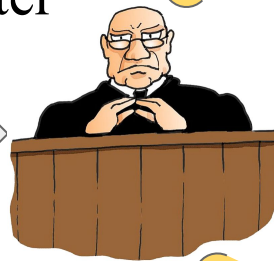
weight function  $wt(\cdot)$

$$wt(\bullet) = 1$$

$$wt(\bullet) = 2$$

$$wt(\bullet) = 5$$

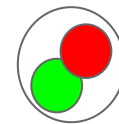
Tester



$$\Pr(F(\mathcal{S}) = \bullet) \neq wt(\bullet) / wt(\mathcal{S})$$

REJECT




The set on which  $F(\cdot)$  is bad.



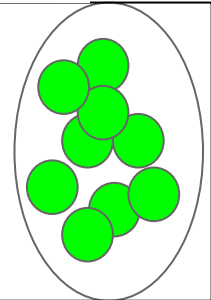
$$\Pr(F(\mathcal{S}) = \bullet) \equiv wt(\bullet) / wt(\mathcal{S})$$

ACCEPT

# Tester design is hard

- Sets can have **exponential** size.
- Blackbox testers need **exponential** samples. 
- **Barbarik [2019]** is a fast **greybox** tester. 
- BUT, only for uniform samplers. 

Uniform Samplers: All weights equal



# Our contribution: Barbarik2

- Barbarik2: a fast\* tester for all weighted samplers.
- We implement and test on state-of-the-art combinatorial samplers.
  - Can distinguish good and bad samplers.
- Open source - <https://github.com/meelgroup/barbarik>



# OUR ALGORITHM :- BARBARIK2

