Workflow part

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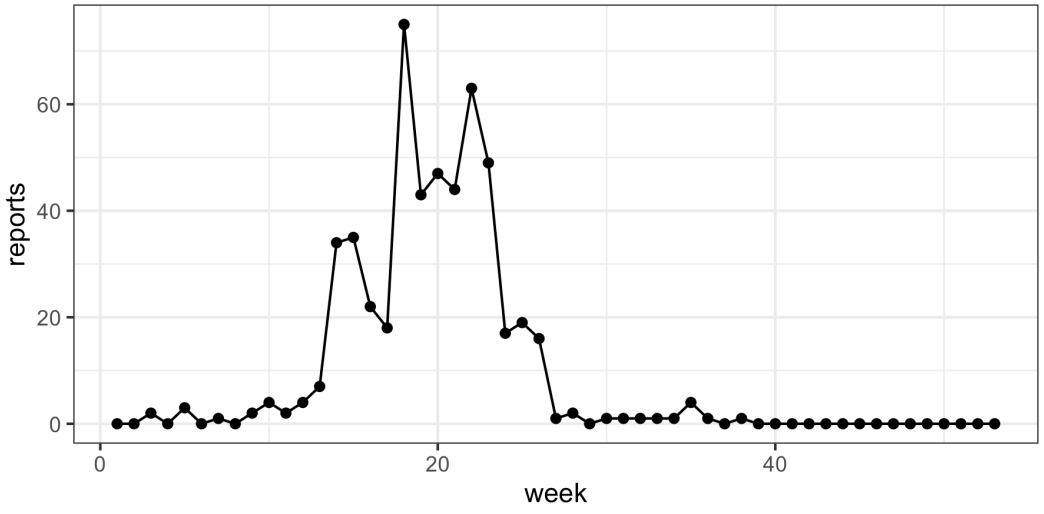
Workflow I

data- initialization-

```
library(tidyverse)
read_csv(paste0("https://kingaa.github.io/sbied/stochsim/",
  "Measles_Consett_1948.csv")) |>
  select(week,reports=cases) -> meas
meas |> as.data.frame() |> head(n=3)
```

```
 week reports
    1       0
    2       0
    3       2
```

Workflow II



Workflow III

```
meas |> pomp(times="week",t0=0) -> measSIR
```

R c-dmeasure rmeasure-

```
sir_stoch <- Csnippet("
  double dN_SI = rbinom(S,1-exp(-Beta*I/N*dt));
  double dN_IR = rbinom(I,1-exp(-Gamma*dt));
  S -= dN_SI;
  I += dN_SI - dN_IR;
  R += dN_IR;
  H += dN_IR;
")
```

Workflow IV

```
sir_rinit <- Csnippet("
  S = nearbyint(Eta*N);
  I = 1;
  R = nearbyint((1-Eta)*N);
  H = 0;
")
sir_dmeas <- Csnippet("
  lik = dnbinom_mu(reports,k,Rho*H,give_log);
")
sir_rmeas <- Csnippet("
  reports = rnbinom_mu(k,Rho*H);
")
```

become pomp-

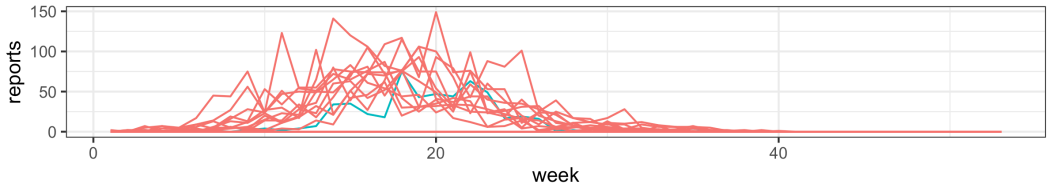
Workflow V

```
measSIR  %>%
  pomp(
    rprocess=euler(sir_stoch,delta.t=1/7),
    rinit=sir_rinit,
    rmeasure=sir_rmeas,
    dmeasure=sir_dmeas,
    accumvars="H",
    statenames=c("S","I","R","H"),
    paramnames=c("Beta","Gamma","N","Eta","Rho","k"),
    params=c(Beta=15,Gamma=0.5,Rho=0.5,k=10,Eta=0.06,N=38000)
  ) -> measSIR
```

simulation/likelihood with the initial guess

Workflow VI

```
measSIR |>
  simulate(nsim=20,format="data.frame",include.data=TRUE) |>
  ggplot(aes(x=week,y=reports,group=.id,color=.id=="data")) +
  geom_line() + guides(color="none")
```



check likelihood and ess

```
pf <- measSIR |> pfilter(Np=5000)
plot(pf)
```

Workflow VII