

Supplementary Document for

# PathwayMapper: a collaborative visual web editor for cancer pathways and genomic data

Istemi Bahceci, Ugur Dogrusoz, Konnor C. La, Özgün Babur, Jianjiong Gao and Nikolaus Schultz

## Notation

In PathwayMapper, nodes can be of the following types:

- **Gene**
- **Family**: subset of genes grouped together under a parent compound node for analysis purposes (e.g. KRAS, NRAS, HRAS, and KIT)
- **Complex**: molecular complex of member genes represented with a parent compound node (e.g. actin-myosin complex)
- **Compartment**: a cellular location for genes and interactions represented with a parent compound node (e.g. nucleus or cytoplasm)
- **Process**: a part of a pathway whose details are to be purposefully hidden under this compound node (e.g. MAPK cascade sub-pathway)

Interaction types, on the other hand, are as follows:

- **Activates**
- **Inhibits**
- **Induces**: transcriptional activation
- **Represses**: transcriptional inhibition
- **Binds**

## Format for Input Data

Pathways can be imported from simple tab-delimited text files, formatted as follows:

```
PTEN and the PI3-Kinase Pathway
```

```
This pathway ...
```

```
--NODE_NAME NODE_ID NODE_TYPE  PARENT_ID  POSX  POSY--  
PTEN    PTEN    GENE    -1  444  46  
PIK3CA  PIK3CA  GENE    -1  360  139  
...
```

```
--EDGE_ID  SOURCE  TARGET  EDGE_TYPE  
PTEN-PIK3CA PTEN    PIK3CA  INHIBITS  
...
```

Here, the first line contains the pathway title followed by a single empty line. Then comes a description of the pathway, again followed by a single empty line. These are followed by nodes with properties: *name*, *ID*, *type*, *parent ID*, *x*, and *y* positions, where parent ID and location information are optional. This is succeeded with a single empty line, followed by edges with properties: *ID*, *source ID*, *target ID*, and *type*.

When a pathway is persisted on disk using “Network > Export”, the same format above is used.

Similarly, genomic alteration data overlaid on a current pathway can be loaded from simple tab-delimited text files. These files should be formatted as follows, where after the gene name one or more data sets follow:

```
gene      lung      ovarian breast
PTEN      -7      -20 10
PIK3CA    18      40  -50
...
```

## Real-Time Collaborative Editing

An example video showing how a pathway can be viewed and edited collaboratively by remote users using the Google Realtime API can be found [here](#).

## Pre-Curated Pathways

A number of pathways from the TCGA manuscripts cited in the manuscript have been made available in PathwayMapper under the Network menu sorted by cancer type. Use the following links to directly open these pathways within PathwayMapper:

- Adenoid cystic carcinoma:
  - [TP53/RB pathway](#)
  - [Wnt pathway](#)
- Bladder Urothelial Carcinoma
  - [Histone modification pathway](#)
  - [RTK RAS PI\(3\)K pathway](#)
  - [TP53/RB pathway](#)
- Breast invasive carcinoma
  - [RTK RAS PI\(3\)K pathway](#)
  - [TP53 pathway](#)
  - [Cell cycle signaling pathway](#)
- Colorectal cancer
  - [RTK RAS PI\(3\)K pathway](#)
  - [TGFbeta signaling pathway](#)
  - [TP53 pathway](#)
  - [WNT pathway](#)
- Glioblastoma multiforme
  - [Cell cycle signaling pathway 2008](#)
  - [RTK RAS PI\(3\)K pathway](#)
  - [TP53 pathway](#)
  - [Cell cycling signaling 2013](#)
  - [RTK RAS PI\(3\)K 2013](#)
  - [TP53 pathway 2013](#)
- Head and Neck squamous cell carcinoma

- [Apoptosis pathway](#)
- [Cell cycle signaling pathway](#)
- [Notch signaling pathway](#)
- [Oxidative stress response pathway](#)
- [RTK RAS PI\(3\)K pathway](#)
- Kidney renal clear cell carcinoma
  - [RTK RAS PI\(3\)K pathway](#)
- Lung adenocarcinoma
  - [Cell cycle signaling pathway](#)
  - [Histone modification](#)
  - [Oxidative stress response pathway](#)
  - [RTK RAS PI\(3\)K pathway](#)
  - [TP53 pathway](#)
- Lung squamous cell carcinoma
  - [Notch signaling pathway](#)
  - [Oxidative stress response](#)
  - [RTK RAS PI\(3\)K pathway](#)
- Ovarian serous cystadenocarcinoma
  - [Cell cycle signaling pathway](#)
  - [Notch signaling pathway](#)
  - [RTK RAS PI\(3\)K pathway](#)
- Skin Cutaneous Melanoma
  - [Cell cycle signaling pathway](#)
  - [Histone modification pathway](#)
  - [RTK RAS PI\(3\)K pathway](#)
  - [TP53 pathway](#)
- Stomach adenocarcinoma
  - [RTK RAS PI\(3\)K pathway](#)
- Thyroid carcinoma
  - [RTK RAS PI\(3\)K pathway](#)
- Uterine Corpus Endometrial Carcinoma
  - [RTK RAS PI\(3\)K pathway](#)
- Esophageal Adenocarcinoma
  - [Cell cycle signaling pathway](#)
  - [RTK RAS PI\(3\)K pathway](#)
  - [WNT pathway](#)